DOCUMENT RESUME

ED 122 951 S 008 584

AUTHOR	Wake, Sandra Byford, Comp.; And Others
TITLE	Research Relating to Children. Bulleting 28: March 1971-August 1971.
INSTITUTION	ERIC Clearinghouse on Early Childhood Education, Urbana, Ill.
SPONS AGENCY	Children's Bureau (DHEW), Washington, D.C.
PUB DATE	Aug 71
CONTRACT	CCD-CB-2
NOTE	142p.
EDRS PRICE	MF-$0.83 HC-$7.35 Plus Postage
DESCRIPTORS	Adolescents; *Annotated Bibliographies; *Child Development; *Children; Classification; Conservation (Concept); Cultural Factors; Delinquency; Educational Research; Exceptional Child Research; Family Relationship; Health Services; Infant Behavior; Longitudinal Studies; *Research Methodology; *Research Projects; Social Services; Socioeconomic Influences
IDENTIFIERS	Concrete Operations; *Developmental Stages; Piaget (Jean)

ABSTRACT

This research bulletin includes reports of research (on children) in progress or recently completed from March through August, 1971. Each entry includes information concerning the investigator, purpose, subjects, methods, duration, cooperating groups, and findings (if available). The reports are listed under several topical headings: (1) long-term research, (2) growth and development, (3) special groups of children, (4) the child in the family, (5) socioeconomic and cultural factors, (6) educational factors and services, (7) social services, and (8) health services. In addition to the reports on research, an extensive review paper entitled "Stage Sequence and Correspondence in Piagetian Theory: A Review of the Middle-Childhood Period" is included. The paper discusses the developmental stages of mathematical-logical thinking (i.e., classification, seriation, and conservation) and the longitudinal, cross-sectional, and training studies in this area. (BRT)

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Research Relating to Children

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Bulletin 28

PS 008584

ERIC Clearinghouse on Early Childhood Education

ERIC CLEARINGHOUSE ON EARLY CHILDHOOD EDUCATION

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The ERIC Clearinghouse on Early Childhood Education is one of 20 clearinghouses in the ERIC nation-wide system and is funded by the National Center for Educational Communication, Office of Education, U. S. Department of Health, Education, and Welfare.

ED122951

RESEARCH RELATING TO CHILDREN

Bulletin 28

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PS 008584

March 1971-August 1971

ERIC Clearinghouse on Early Childhood Education

NOTES: *Research Relating to Children* is prepared by the ERIC Clearinghouse on Early Childhood Education under the direction of Lilian G. Katz, Ph.D. Investigators who wish to submit abstracts of their research projects should address correspondence to:

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Research Relating to Children, Bulletin 28 was prepared by the ERIC Clearinghouse on Early Childhood Education pursuant to Contract OCD-CB-2, Children's Bureau, Office of Child Development, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official Office of Child Development position or policy.

PREFACE

With this issue of Research Relating to Children we are introducing as a new feature a review paper on a topic of major interest to research workers in the field.

The topical paper in this issue, *Stage Sequence and Correspondence in Piagetian Theory: A Review of the Middle-Childhood Period,* was prepared by Dr. Frank H. Hooper and his associates at the University of Wisconsin School of Family Resources and Consumer Sciences. The review includes an examination of the research on logico-mathematical and infralogical operations and is addressed to the issues surrounding the invariance of stages as indicated by studies of children during the middle childhood years. We are grateful to Dr. Hooper and his associates for making their work available for inclusion in *Research Relating to Children.*

Bulletin 28 includes reports of research in progress or recently completed research. With the exception of Long-term Research, it does not repeat studies included in *Bulletins 3* through *27,* even though they are still in progress. This issue, therefore, does not reflect all research relating to children, but only research reported to ERIC Clearinghouse on Early Childhood Education from March 1971 through August 1971.

Publication references and plans are cited by some of the investigators, but the Clearinghouse does not maintain bibliographic information on published reports of the studies. If you wish to obtain further details about any of the projects, please check professional journals in the appropriate field or write directly to the investigator.

Lilian G. Katz, Ph.D.
Director
ERIC Clearinghouse on Early Childhood Education

To Research Investigators:

This publication is only as complete as you are willing to make it. On page 137 you will find a form for reporting your current research. On page 141 you will find a form to let us know of other investigators who are working in the field. Please let us hear from you.

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STAGE SEQUENCE AND CORRESPONDENCE IN PIAGETIAN THEORY: A REVIEW OF THE MIDDLE-CHILDHOOD PERIOD

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INTRODUCTION

The large number of research studies derived from Piagetian theory which have been carried out during the past decade pose a considerable problem for the aspiring review writer (Elkind & Flavell, 1969; Flavell, 1970; Sigel & Hooper, 1968). The majority of these studies have evaluated (1) the average age of acquisition of a particular concept, (2) the effect of status variables (e.g., SES, sex, IQ, years in school, vocabulary) on performance, (3) the effect of experimental manipulations (e.g., instructional set and task format) on concept acquisition, and (4) the effect of training on concept acquisition. In almost all of these cases the claim is made that some *critical* aspect of Piagetian theory is being evaluated. Yet, in attempting to summarize the major conclusions from these studies, inspired by the original Piagetian theory and related normative findings, one is immediately impressed by the lack of general agreement concerning the behavioral achievements and underlying processes that make up human cognitive development.

In this context, Wohlwill (1963) was reminded of a formally similar "search":

> . . . I am reminded here of the hunt for the wozzle in Winnie-the-Pooh. Most of you recall, I am sure, the delightful episode in which Winnie-the-Pooh and Piglet set about somewhat apprehensively stalking this animal they have heard about, without any idea of what it looks or acts like. Following with increasing alarm a set of footsteps (which are of course their very own) they wind up merrily going around in circles, until Christopher Robin arrives on the scene to rescue them from their predicament. I wonder whether some of the currently flourishing work ostensibly aimed at validating Piaget does not show a somewhat similar lack of appreciation for the nature of the beast which it is trying to track down (p. 254).

Thus, the bulk of current studies carried out in the Piagetian framework does not appear to share a common focus regarding the major assumptions or theoretical postulates inherent in the Piagetian orientation to cognitive development.

Jean Piaget states that cognitive development follows three discrete, invariant stages: (1) sensorimotor, (2) concrete operations, and (3) formal operations. During the initial portion of the sensorimotor period (approximately birth to 2 years) the infant's behavior is limited to the reflexes with which he is born. As the infant grows, he is able to receive information through various sensory modalities and to integrate this information into different patterns. During Stage I, the child is also starting to develop symbolic thought. This thought is marked by the appearance of intentional variations in behavior in order to produce new behaviors. Toward the end of Stage I, "The infant clearly attributes to

objects a degree of substance and permanence; he begins to conceive of objects as autonomous and as independent of his own subjective state" (Ginsburg & Opper, 1969, p. 67).

In the beginning of Stage II, the period of concrete operations (approximately age 2 to 11 years) the child's functioning appears to be primarily intuitive. Stendler (1965) summarized the major aspects of the child's thought during this period:

> 1. The child is perceptually oriented; he makes judgments in terms of how things look to him. Piaget has shown that perceptual judgment inters into a child's thinking about space, time, number, and causality. It is only as the child goes beyond his perceptions to perform displacements upon the data in his mind that conservation appears.
>
> 2. The child centers on one variable only, and usually the variable that stands out visually; he lacks the ability to coordinate variables.
>
> 3. The child has difficulty in realizing that an object can possess more than one property, and that multiplicative classifications are possible. The operation of combining elements to form a whole and then seeing a part in relation to the whole has not yet developed, and so hierarchical relationships cannot be mastered (p. 332).

It is during the later portion of this phase that the child develops the concept of conservation, the realization on the child's part that certain characteristics of objects are lasting regardless of perceptual transformations. Formal operations, Stage III (approximately age 11 to adolescence), constitute the apex of the child's understanding of complex problems of reasoning. During this stage, the child becomes able to deal with many possibilities at once, evaluate alternatives, and select the most logically appropriate alternatives using hypothetical deductive reasoning.

Basic to Piaget's theory of stages are two assumptions: (1) *the invariant order of stages:* the steps marking the development of a concept appear according to a fixed orderly progression—in the sequence of stages A-B-C each child goes from stage A to stage B to stage C. This order of acquisition never changes; later stages can never precede earlier stages, and no stage is ever skipped; and (2) *correspondence within stages:* responses to taksks which differ but which, according to the theory, are based on the same mental operations, develop simultaneously.[1]

The purpose of the present review is to evaluate (1) the extent to which the current literature confirms or refutes the postulate of a universally invariant stage sequence, and (2) the extent to which the current literature confirms or refutes the postulate of correspondence within stages. The general age confine of the review is the interval of middle childhood (approximately 4 to 12 years) associated with the period of concrete operations.

This review is organized into two sections: (1) cross-sectional research, and (2) repeated measurement research. The first section deals with cross-sectional research in which measurement of the various differing age subsamples occurs at only one point in time. The cross-sectional research is divided into two groups: (1) those dealing with logico-mathematical operations, and (2) those dealing with infralogical operations. The studies of logico-mathematical operations included in this review deal with the concepts of classification, seriation, number, and transitivity. Infralogical operations are formally similar and developmentally parallel to logico-mathematical operations, but deal with concepts which are spatio-temporal and continuous in character (Flavell, 1963). Studies of infralogical operations which are included in this review deal with concepts of space, distance, and quantity (which includes identity and equivalence conservation).

The second section of this review is concerned with studies involving repeated measurement designs: (1) longitudinal studies, and (2) training studies. Longitudinal studies are those in which a task or series of tasks are administered repeatedly to the subject (or group of subjects) at different points in time. Training studies involve pretesting children on a series of tasks, training them on related tasks, and posttesting them in order to measure what effect the training had on the child's ability to do various similar and dissimilar tasks.

Quantity Conservation

A great deal of Piagetian research has centered upon the concept of conservation of quantity. A quantity such as a lump of plasticine, a collection of beads, a length or a surface area can be dealt with only if it remains permanent in amount and independent of the rearrangement of its individual parts. This notion of invariance is essential to any kind of measurement in the physical world (Lovell & Ogilvie, 1960).

Based on their many experiments of conservation of quantity, Piaget and Inhelder (1962) have concluded that initially the child's concept of quantity is undifferentiated; that is, the child does not have distinct and separate concepts of mass, weight, and volume. Furthermore, as conservation of quantity develops it follows an invariant sequence. The child first develops the conservation of mass; second, the conservation of weight; and finally, the conservation of volume (any sequence of invariant order within a given stage is referred to, by Piaget, as a horizontal decalage).

From the results of his research, Piaget maintains that the development of conservation consists of three stages: nonconservation, transition, and conservation. In a typical experiment, a child would be shown two clay balls identical in all respects, one of which was subsequently transformed to look like a sausage. At the first stage (nonconservation) the child will deny that the *amounts* of clay in the sausage and ball are now the same. A response such as "It's more because the sausage is longer" is frequently observed. At the second stage (transition) he will arrive at the idea of conservation under some conditions, or at one moment, but will lose the idea again under slightly changed conditions (Piaget & Inhelder, 1962). During the third stage (conservation) the child is aware of the logical necessity for conservation and will support it by argument. For example, Piaget (1950, 1953) maintained that the child will say that the sausage can be returned to the shape of the ball, or that what has been lost in one direction has been gained in another, or that nothing has been taken away. Once this final stage of conservation of mass (or weight or volume) has been attained, it holds in all instances of conservation of that specific concept, regardless of the particular material involved.

This section of the review will evaluate Piaget's postulates that (1) the conservation of quantity follows an invariant developmental sequence of mass (substance, amount), weight, volume; (2) that the development of conservation consists of three stages: nonconservation, transition, and conservation; and (3) that once a concept of conservation has been attained, it holds in all instances.

Replicating Piaget's work on the conservation of mass, weight, and volume, Elkind (1961) tested 175 children, 25 from each grade, kindergarten through 6. Each subject was seen individually and questioned three times on each of the three forms of conservation of quantity. For each quantity the child was asked first, to predict; second, to judge; and third, to explain his responses. The order of the questions and the order presenting the items: (1) mass, (2) weight, and (3) volume was the same for all subjects. Elkind, like Piaget, found that conservation of mass is easiest to discover, conservation of weight is of intermediate difficulty, and conservation of volume is the most difficult discovery of all. His data also supported Piaget's findings that children's predictions, judgments, and explanations can be used interchangeably as signs of conservation or nonconservation.

McRoy (1967) also evaluated the development of the concept of quantity. Subjects were 100 children, ages 5, 6, 8, 10, and 12, with an equal number of males and females in each group. Each subject was given a series of 11 tests dealing with the manipulation of quantity. The tests were administered in the hypothesized order of difficulty. In contrast to

Elkind's (1961) results, McRoy found only partial support for the prediction of an invariant, sequential relationship among the component concepts of conservation of mass, weight, and volume. Whereas, the volume concept emerged as the most advanced of the three components, no relationship to the predicted sequence was found between the other two concepts of mass and weight.

In an effort to trace the development of the concept of invariance of substance (mass), Lovell and Ogilvie (1960), using a Piagetian format, interviewed most of the boys and girls in a junior school in a North England county. The results supported Piaget's hypothesis of three stages in the development of the concept of conservation: nonconservation, transition, and conservation. However, they also indicated that conservers of continuous quantity in one situation are not inevitably conservers in another. Lovell and Ogilvie concluded that the concept of conservation is applicable only to highly specific situations at first; it increases in depth and complexity with experience and maturation.

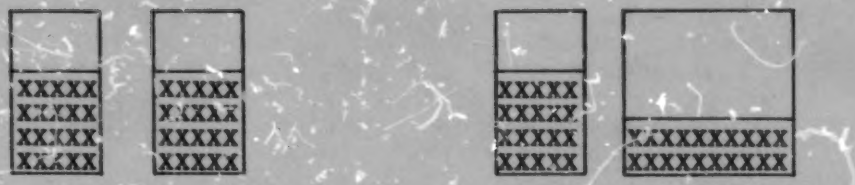
In an attempt to trace the development of the conservation of weight, Lovell and Ogilvie (1961) tested 364 children in a junior school. The children were tested individually using a Piagetian format. As in their 1960 study of substance, these results supported Piaget's hypothesis of three stages in the development of the concept of conservation. However, they also showed that children who are conservers of weight in a Piagetian type task are often nonconservers in other tasks of conservation of weight. Overall, their results led them to suggest that "while logical thought may be a necessary condition for conservation of weight it is not a sufficient condition. Sheer experience of the physical world seems to play a more important role than Piaget reckons" (p. 138).

Uzgiris (1964) systematically investigated the effect of varying the task materials on the observed sequential attainment of the conservation of substance, weight, and volume. Subjects were 10 boys and 10 girls from each grade, 1 through 6. Each subject, tested individually, was presented with four materials (plasticine balls, metal nuts, wire coils, and plastic wire) in a counterbalanced order. For each material, questions regarding the conservation of substance were always asked first, then those regarding the conservation of weight, and finally, those of volume. Her results indicated that the conservation of substance, weight, and volume were clearly attained in the order postulated by Piaget. Furthermore, this same sequence holds for any given material. However, once the concept of conservation of substance (or weight, or volume) had been attained for one material, it was not necessarily achieved for all materials. This variation did not seem to be systematic; there was no single material on which all subjects either accelerated or lagged behind. The variation seemed to be more a matter of individual differences, although the discrepancies generally were not large. It is also interesting to note that the second order interaction (age x task type x material type) was significant. This result adds further support to Uzgiris' original contention regarding the interdependence of age, type of conservation, and stimulus material in question.

Investigating the effect of stimulus conditions on conservation of performance, Schwartz and Scholnick (1970) assessed children's abilities to make judgments of quantity (1) when perceptual cues and logical judgments were congruent, and (2) when perceptual cues and logical judgments were contradictory (see Figure 1). The subjects, 40 nursery school kindergarten children, were individually given a battery of tasks measuring conservation of discontinuous quantity. The authors found that children are able to make judgments to conserve quantity when perceptual cues and logical judgments are congruent before they are able to conserve quantity when perceptual cues and logical judgments are contradictory. The authors concluded that stimulus complexity is a factor in children's conservation judgments.

Figure 1

Perceptual Cues and Logical Judgments



A = B

Perceptual cues and logical judgments are congruent.

A = B

Perceptual cues and logical judgments are contradictory.

In another comparison of stimulus materials, Murray (1969) compared the child's conservation of a clay ball's mass, weight, and volume under a shape transformation (rolled into a sausage) to the child's conservation of his own mass, weight, and volume under an analogous transformation (the child crouched, as opposed to standing upright). Subjects were 53 first and second graders. Murray found that significant numbers of subjects who conserved the mass, weight, or volume of the clay ball failed to conserve the same quantities in themselves. He suggested that another lag in concrete operational thought is that between conservation of object properties and conservation of the same properties in oneself.

This section of the review has covered a selected number of studies concerned with the conservation of quantity. These studies offer strong support for Piaget's and Inhelder's (1962) theory that the conservation of quantity follows a particular invariant developmental sequence. The child first develops conservation of mass, then conservation of weight, and finally, conservation of volume. However, although the conservation of mass, weight, and volume seems to be attained in the same sequence with any material, there is not a perfect coordination of steps in the conservation sequence across different materials in any one individual (Uzgiris, 1964). The studies also support Piaget's and Inhelder's (1962) hypothesis that conservation of quantity develops through three invariant stages: nonconservation, transition, and conservation. While during the stage of nonconservation the child *never* conserves and during the stage of conservation the child *always* conserves, during the transitional stage the child's judgments of conservation are extremely variable. A number of factors, among which are stimulus complexity (Schwartz & Scholnick, 1970), stimulus materials (Lovell & Ogilvie, 1960, 1961; Murray, 1969), and task format (Lovell & Ogilvie, 1961) have been identified as influencing this variability of judgments. While Uzgiris (1964) suggested that this response variation during transition is not systematic, Lovell and Ogilvie (1960) concluded that, with experience

and maturation, conservation systematically increases in both depth and complexity. At this point it is clear that the evidence is not conclusive concerning (1) the effect of various stimulus conditions on the transitional child's judgments of conservation, or (2) the transitional child's progress through an "invariant developmental sequence." Further research is definitely needed on this transitional period.

Identity and Equivalence Conservation

The quantity of literature dealing with problems of conservation testifies to the significance that Piaget and other investigators attach to these problems. The typical Piagetian conservation task can be conceptually divided into three segments. In the first, the subject is presented with two stimuli (A and B) which are equal in appearance and content; in the second segment, one of the original stimuli (B) is transformed so that it *appears* different from the standard stimulus (A), although it retains its original criterial content (such as weight); and in the last part of the sequence, the subject is questioned concerning the relationship between the standard stimulus (A) and the transformed stimulus (C). Such tasks may be outlined as follows (Elkind, 1967; Hooper, 1969b): Time 1: A = B; Time 2: B→C; Time 3: A ? C.

Elkind (1967) reconsidered some fundamental aspects of the conservation problem and postulated that every conservation problem really assesses two forms of conservation: conservation of identity and conservation of equivalence. Conservation of identity is defined as "the conservation of a given weight, length, number, etc. across a reversible transformation and with respect to itself alone" (p. 25); i.e., the comparison of a quantity to itself in a different form. In the standard conservation problem the child is never asked to compare B and C directly. Conservation of equivalence is defined as "the invariance of a quantitative relation across a transformation of one of the elements of the relationship" (p. 25); i.e., two quantities are still judged the same even though one has been transformed. It can be seen that the standard conservation problem outlined above (A = B, B→C, A = C) provides a direct test of the conservation of equivalence. Elkind hypothesized that the conservation of identity appears before the conservation of equivalence. On the other hand, Piaget and Inhelder (1962) assumed that identity and equivalence conservation develop simultaneously. The following studies investigated the developmental relationship of these two forms of conservation.

Investigating Elkind's (1967) distinction between identity and equivalence conservation, Hooper (1969b) in an independent measures design, assessed the relationship between these two forms of conservation. Thirty-six subjects were drawn from the kindergarten, first, and second grades in schools in predominantly white, middle class neighborhoods. For all ages combined, Hooper found that equivalence conservation was a more difficult task than identity equivalence. However, the differences between the identity and equivalence conservation were most notable among the kindergartners; these differences tended to diminish among the first and second graders. Hooper concluded that identity conservation is developmentally prior to equivalence conservation, because the latter requires an additional deductive sequence.

Further evidence for the developmental priority of identity conservation emerges from an analysis of the types of justifications used to explain identity and equivalence judgments. Identity explanations were generally based on addition-subtraction schemata; i.e., "No seeds were added or taken away." In contrast, equivalence judgments were frequently explained by reference to the previous state of equality between stimuli A and B, an integral aspect of the postulated deduction sequence.

The same general trend was found for low SES subjects of 5-5 to 6-5 years old (Hooper, 1969a; Hooper & Marshall, 1968). Although 75 percent of the children failed both

identity and equivalence tasks for conservation of discontinuous quantity (small seeds) and 13.75 percent passed both tasks, 11.25 percent passed identity and failed equivalence. No child passed equivalence but failed identity.

Bruner *et al.* (1966) investigated qualitative identity conservation: the knowledge that a substance remains the *same* in the face of transformation of an irrelevant attribute. For example, water, when it is poured from a standard container into a perceptually different comparison container, is still *the same* water. Following such a transformation, the child is questioned about whether the substance is the same despite perceptual alteration. Bruner considers the ability to conserve quality (same water) to be a necessary prerequisite for success in conserving quantity (same amount of water—Elkind's, 1967, task of quantitative equivalence).

Nair (in Bruner *et al.*, 1966) examined the priority of the qualitative identity concept discussed by Bruner and by Piaget (1968). Five-year-old kindergarten pupils were able to report that water poured from container to container is "the same water," although they were not always successful in reasoning that the amount of water also remains constant in the face of purely perceptual alteration. Nair found that virtually all children who exhibited equivalence conservation also exhibited identity conservation, while the reverse did not hold; many children who exhibited conservation of identity did not exhibit equivalence conservation. She concluded that the conservation of identity develops before the conservation of equivalence. She also reported that children questioned on identity conservation prior to equivalence conservation were more apt to answer identity and equivalence questions correctly than were children who received the questions in reverse sequence. She attributed this phenomenon to the fact that identity questions highlight equivalence concepts.

Schwartz and Scholnick (1970) investigated the effect of the stimulus situation on the conservation of identity and equivalence. Subjects were 32 females and 8 males attending private suburban nursery schools and kindergartens. For all tasks, candies were poured from one glass to another and the child gave a nonverbal response as to which had more. The subjects were asked to make direct comparisons, identity, and equivalence judgments under two conditions: (1) the glasses to be judged were the same in diameter, and (2) the glasses to be judged were of different diameter. Results indicated that when the containers were of identical diameter, identity and equivalence judgments were of equal difficulty. When the two containers differed in diameter, judgments of equivalence were more difficult than judgments of identity. As predicted, the various tasks could be scaled according to order of difficulty. Based upon the significant interaction between stimulus setting and judgments, the authors concluded that, "the relative difficulty of each of the sequences of logical judgments which make up conservation also depends on the stimulus setting in which the judgment is made . . . the more dimensions in which the standard and transformed stimuli vary from each other, the greater the difficulty of judgment" (p. 702).

In a follow-up to the Bruner *et al.* (1966) and Hooper (1969b) research, Papalia and Hooper (1971) examined the interrelationships among qualitative identity (same object) conservation, quantitative identity (same amount with a single object), and conventional equivalence conservation for the content domains of quantity and number. Subjects were 60 four-, 5-, and 6-year-old children of middle socioeconomic class background. Following a repeated measures design, all children received a battery of tasks which included qualitative identity, quantitative identity, and equivalence conservation of quantity problems as well as qualitative identity, quantitative identity and equivalence conservation of number tasks. For the quantity battery significant performance differences in the mean number of trials passed indicated that the order of acquisition of quantity tasks did conform to the hypothesized sequence: qualitative identity, quantitative identity, and equiva-

lence conservation. Significant performance differences in the direction of quantitative identity superiority over equivalence conservation were found. No significant performance differences for number concepts were noted. The authors concluded that identity concepts develop prior to equivalence concepts when the content area is quantity conservation. On the other hand, clear-cut conclusions cannot be made about number conservation.

In contrast to the findings reported above, three studies have failed to find the predicted developmental priority of identity conservation. Observing 120 first, second, and third grade subjects of two socioeconomic levels. Teets (1968) did not find the priority of identity conservation on weight identity and equivalence conservation tasks. Stimuli were four configurations of different colored plastic (Lego) blocks that maintained the same weight despite perceptual alteration. Eighty-two subjects passed identity and equivalence tasks; 24 subjects failed both tasks; 8 subjects failed the weight identity but passed the weight equivalence tasks; 6 subjects passed the identity but failed the equivalence tasks. While the first grade lower social class comparison, in which greater numbers of children passed identity as compared to equivalence conservation was significant, none of the other overall comparisons were significant.

Northman and Gruen (1970), using older subjects, also investigated the relationship between identity and equivalence conservation in the conservation of liquid quantity. Subjects were 60 second and third grade children from an urban school in a working class neighborhood. Each child was given three identity conservation and three equivalence conservation tests in one of six orders. Northman and Gruen found no evidence of identity conservation in the absence of equivalence conservation. They concluded that, "The results do not support the hypothesis that conservation of identity precedes conservation of equivalence. The data do support Piaget's contention that these two types of conservation emerge together" (p. 311).

Murray (1970) presented children with both identity and equivalence tasks involving conservation of number. Subjects were 15 children about to enter first grade and 10 children about to enter second grade. All subjects were enrolled in a special summer program for the teaching of science and mathematics. Contrary to Elkind's expectations, Murray found no significant differences between identity and equivalence problems of number conservation. These results (in addition to Northman's & Gruen's findings) may differ from those of Hooper (1969b) because of the age differences of the subjects tested and/or the differences in content areas analyzed.

These studies investigating the relationship between conservation of identity and conservation of equivalence offer some evidence (Hooper, 1969a, 1969b; Papalia & Hooper, 1971; Nair in Bruner *et al.*, 1966; Schwartz & Scholnick, 1970) in support of Elkind's hypothesis that conservation of identity develops before conservation of equivalence. Contrary to Piaget's (1968) assumption that quantitative identity and equivalence conservation always develop simultaneously, it is clear that, at least under certain conditions, the two do not develop simultaneously. However, before it will be possible to objectively evaluate the relationship between these two forms of conservation, it will be necessary to carefully control the conditions under which children are asked to respond. Age of subject, content area, materials used, tasks presented, order of task presentation, instructions, etc. must be carefully controlled before results can be compared and evaluated. It is quite probable that most of the contradictory results cited in this section are due to differences in these variables. Once these variables are controlled, emphasis must be directed toward individual differences during the transitional period between nonconservation and conservation. It is quite likely that the *all-or-none* results of a number of the studies cited were a result of the cross-sectional designs and subsequent score analyses they employed. These techniques, in concentrating on the majority of children

who are either conservers (Stage 3) or nonconservers (Stage 1), mask information concerning the small number of transitional children who are the most appropriate subjects for any analysis of the relationship between identity conservation and equivalence conservation.

Spatial-Geometric Concepts

In the current review, spatial-geometric concepts are primarily represented by experiments specifically concerned with distance conservation and the spatial coordinate system. According to Piaget's theory, distance conservation requires that distance must remain constant (1) whether the space between two points is filled or empty, and (2) regardless of the direction of travel between the two points. This concept is postulated to be acquired by the child at approximately 7 years of age. The spatial coordinate system is theorized as meaning that horizontality and verticality are independent of the perceptual properties of objects and the immediate surroundings. This concept is postulated as being acquired by the child at approximately 9 years of age. The coordinate system is used as a reference for locating and comparing the positions and orientations of objects in space.

Tasks which are commonly used to test for distance conservation measure whether the child (1) conserves distance if the distance is filled or empty, and (2) conserves distance if the direction of movement between objects or points is changed. It is common to vary the task stimuli with respect to the type of object and the relative heights of the objects. The coordinate system tasks include the water-line bottle tasks for horizontality and the mountain figure task for verticality. As described by Ford (1970), Piaget finds three major stages and substages in the development of the water-line concept:

Stage I — before age 4 or 5, child shows no recognition of the idea of a water line.

Stage IIa — child believes that the line stays parallel to the base of the jar, no matter how it is tipped.

Stage IIb — child becomes aware that the water line shifts relative to the base of the jar, but does not yet realize that it remains horizontal.

Stage IIIa — beginning at age 7 or 8, child can learn the concept if given some training.

Stage IIIb — about 9 years, immediate prediction of horizontal water line, regardless of the tilt of the jar.

Shantz and Smock (1966) conducted an experiment to test Piaget's hypothesis that the child acquires distance conservation before he masters the coordinate system. Subjects were 20 male and female children, ages 6-4 to 7-10. The distance conservation tasks and coordinate system tasks were counterbalanced across all subjects. They found all but one subject supporting Piaget's hypothesis. This subject was considered to be a case of measurement error. The results also indicated that distance conservation was easier with drawings than with objects.

Vandeventer (1968) did a similar study using 10 black male and 10 white male subjects, ages 6-5 to 7-4, testing them on the same counterbalanced tasks of distance conservation and spatial coordinates that Shantz and Smock (1966) used. She found six children who were able to pass the coordinate system tasks but failed the distance conservation tasks, thus finding only partial support for Piaget's hypothesis.

Ford (1970) tested 20 male and female subjects ages 4-2 to 6-0 on distance conservation and spatial coordinates tasks and on the difference between prediction and perception of each task. The results showed that perception was easier than prediction. Nineteen of the subjects followed the postulated sequence of task acquisition. Ford's results indicated

a predominance of Piaget's Stage II errors, which supports the postulated sequence of development for the children tested.

Dodwell (1963) carried out a comprehensive study of children's acquisition of spatial concepts. He developed tasks measuring seven discrete but interrelated spatial concepts postulated by Piaget: (1) construction of straight line, (2) drawing shapes, (3) plane figures, lines, points, and continuity, (4) horizontal and vertical coordinates, (5) geometric sections, (6) similarity and proportion, and (7) coordination of perspective. Subjects were 194 children ages 5-1 to 11-3. He found that, on the whole, Piaget's assertions about the development of spatial concepts were corroborated. He did not, however, find it possible to assign any child to a particular stage of development, either in terms of the type of spatial (geometric) concept the child held, or the correctness of his answers within a particular conceptual framework. He found evidence that for each stage there was a great deal of overlap between ages, so that age limits could not be precisely identified.

Overall, the evidence presented in the studies reviewed supports Piaget's theories of the developmental sequence of spatial-geometric concepts. However, while 52 of the children in the three reviewed studies performed as predicted, there were also eight notable disconfirmations of this sequence in the three studies (Shantz & Smock, 1966; Vandeventer, 1968; and Ford, 1970). The problem remains of dealing with these transgressions which were merely attributed to measurement error. A fourth study (Dodwell, 1963) essentially agreed with Piaget's theory of developmental stages but found that precision in assigning children by age to a particular substage could only be approximated. Adequate understanding of the development and attainment of Piagetian concepts of space must await more intensive longitudinal studies that demonstrate methodological clarity.

Classification and Seriation

Piaget's assumptions of the invariant order of stages and of correspondence within stages have also been explored in studies investigating development of the skills of classification and seriation. According to Piaget, classification involves grouping objects according to their similarities and/or differences. Seriation involves arranging objects in a series according to dimensions on which they differ. Inhelder and Piaget (1964) contended that classification begins when the child groups together two objects that are equivalent because they look alike in some way. As the child grown, he learns to extend the scope of his grouping from two, to more than two, to all the objects that could be considered equivalent in some respect. When the child starts to recognize that objects belong to more than one class, he also begins to describe the way in which classes overlap. Finally, the child is able to join subclasses to form superordinate classes and, reciprocally, to divide superordinate classes into subclasses. Inhelder and Piaget also maintain that the more abstract the presentation of items (e.g., verbal versus visual presentation), the more difficult it is for the child to classify the items.

According to Inhelder and Piaget (1964), seriation is attained when the child understands that in a series of objects ordered from shortest to longest (lightest to heaviest, etc.) any item is simultaneously longer than the preceding item and shorter than the subsequent item. Piaget (1952) defined three distinct stages in the development of seriation. In the first stage, the child can arrange only a few objects on a given dimension. At the second stage, he can seriate a number of objects but only by trial and error. By the third stage, he can seriate readily by systematically selecting objects according to the given dimension. Concerning the relationship between seriation and classification, Inhelder and Piaget (1964) predicted that the four operations of simple classification, multiple classification, simple seriation, and multiple seriation appear at approximately the same time.

Outlined below are representative studies that have investigated Piaget's hypotheses regarding (1) the development of classification, (2) the development of seriation, and (3) the developmental relationship between classification and seriation.

Investigating Piaget's assumption that there is a fixed order in which concepts are acquired, Kofsky (1966) explored the development of classificatory skills. After summarizing Inhelder's and Piaget's (1964) theory regarding the development of classificatory rules, Kofsky translated their hypothesized levels of development into 11 experimental tasks. These tasks were used to test two aspects of Piaget's theory: (1) that the order of difficulty of these tasks corresponds to the developmental sequence described by Piaget, and (2) that children who have acquired a particular rule have also mastered all the simpler prerequisite tasks. Subjects were 10 boys and 10 girls at each age level between 4 and 9 years. Each of the 11 tasks was administered in a random order to the individual subjects. Using scalogram analysis, Kofsky found that, overall, the order of difficulty of the tasks followed the developmental sequence described by Piaget. However, the order of mastery of the tasks was not invariant from subject to subject. Kofsky concluded that individuals vary in the sequence that they master this array of cognitive tasks as well as in the steps by which they master a particular cognitive task.

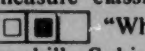
Investigating the effect of stimulus conditions on the development of classificatory skills, Wohlwill (1968) compared children's responses to class inclusion questions (i.e., Given six dogs and two horses, are there more dogs or animals?) when the items were presented in pictorial (concrete) as opposed to purely verbal (abstract) form. Over several replications of the same prototype experiment with children between the ages of 5 and 7, Wohlwill found a consistent, significant superiority of the verbal condition over the pictorial one. In addition, he found that children's performance on class inclusion items in pictorial form is strongly affected by perceptual sets elicited by the stimuli. These results contradicted Inhelder's and Piaget's (1964) contention that the more abstract the presentation of the objects, the more difficult it is for the child to classify them.

Concerned with the development of seriation skills, Elkind (1964) replicated Piaget's work using standardized procedures and more clearly defined populations. The subjects, heterogeneous with respect to socioeconomic background and intelligence, were 90 children—30 at each age level from 4 to 6. Using size-graded materials, Elkind had the children seriate various numbers of objects. His findings confirmed Piaget's hypothesis of three stages in the development of seriation: at stage one the child builds disconnected pairs of elements but makes no attempt to coordinate them; when he has reached the second stage, the child is able to construct a correct seriation, but only after considerable trial and error; at the third stage, the child can mentally coordinate the relations between objects and systematically place them in the correct order.

Lovell, Mitchell, and Everett (1962) attempted to identify the relationships among a number of classification and seriation tasks. In doing so they replicated many of the experiments originally reported by Inhelder and Piaget (1964). Their subjects were samples of primary pupils and a group of educable retarded children. (It should be pointed out that a number of studies that have investigated the performance of retarded children on a variety of Piagetian tasks have found essentially the same pattern of acquisition as that of *normals* although delayed to varying degrees; e.g., see the work of Hood, 1962; Inhelder, 1966; Wolinsky, 1965; Woodward, 1961, 1962.) In contrast to Inhelder and Piaget, Lovell *et al.* presented an entire array of tasks to each subject in the sample, permitting analysis of intraindividual consistency for the classification-seriation behaviors in question: addition of classes, multiplication of classes, visual seriation, and multiplication of asymmetrical transitive relations. The children demonstrated consistent stage type behavior across the four task settings evaluated (i.e., the ability to perform the four logical tasks appeared at about the same time). In view of these results, the authors

supported Inhelder's and Piaget's view that seriation and classification are parallel achievements.

MacKay, Fraser, and Ross (1970) also investigated the relationship between the development of seriation and the development of classification. Their subjects, 138 children attending a Scottish primary school, each completed one of three different 3 x 3 matrices. MacKay *et al.* found that the ability to construct a matrix composed of discrete categories (multiple classification) precedes the ability to construct a matrix composed of relational variables (multiple seriation). They concluded that this interval between the emergence of multiple classification and multiple seriation challenges the Piagetian hypothesis (Inhelder & Piaget, 1964) that simple classification, multiple classification, simple seriation, and multiple seriation all become operational at roughly the same time.

Relevant to any discussion of the development of classification and seriation is Smedslund's (1964) monograph on intellectual development. For this comprehensive study, he constructed nine items, each measuring a different aspect of concrete reasoning. Two of these tasks, class inclusion ("Are there more animals or dogs?") and multiple classification (shape x color "What goes in the empty cell?" [△] measure classificatory skills. One task, multiplicative relations (shade of color x size  "What goes in the empty cell?" [larger darker square]), measures a seriation skill. Subjects were 160 children ranging in age from 4-3 to 11-9. Results clearly indicated that class inclusion develops prior to both multiplication of classes and multiplication of relations. On the other hand, the development of multiplication of classes seems to parallel the development of multiplication of relations.

Siegelman and Block (1969), using scalogram analysis, reanalyzed Smedslund's (1964) data in order to ascertain patterns of performance on the cognitive tasks. Because of its high correlation with the multiplication of relations item, they dropped the multiplication of classes item from the analysis. This reanalysis of the data, looking at individual patterns of responses, indicated that class inclusion (simple classification) precedes multiple relations (in this case a discrete category x relational category matrix).

In general, these studies support Piaget's theory that there is a fixed order in which concepts are acquired. Kofsky's (1966) data indicated that there are regular stages in the development of classificatory skills. Similarly, Elkind's (1964) data indicated that there are distinct stages in the development of seriation. Although this evidence supports Piaget's theory of stage sequencing, the evidence does not indicate that the sequencing is invariant. Many replications of Piaget's work (Dodwell, 1960; Hyde, 1959; Kofsky, 1966; Lovell, Mitchell, & Everett, 1962; Lunzer, 1960) have concluded that individuals vary in the sequence that they master cognitive tasks as well as in the steps by which they master a particular cognitive task. Furthermore, the child's ability to classify or seriate appears to be influenced by the stimulus setting in which his judgments are made. This influence of the stimulus setting is most likely not just a function of the abstractness of the items presented. In fact, Wohlwill's (1968) data contradicted Inhelder's and Piaget's (1964) hypothesis that the more abstract the presentation of the task, the more difficult it will be for children to classify items.

At this point, evidence is inconclusive concerning the relationship between the development of seriation and the development of classification. While Lovell, Mitchell, and Everett (1962) supported Inhelder's and Piaget's (1964) view that seriation and classification are parallel achievements, MacKay, Fraser, and Ross (1970), Smedslund (1964), and Siegelman and Block (1969) offered contradictory evidence. Most likely a major reason that this evidence is far from conclusive is that the researchers have not yet agreed upon operational definitions of the developmental steps hypothesized in Piagetian theory

of classification and seriation. For example, Smedslund's (1964) finding that multiple classification seems to parallel the development of multiple seriation contradicted MacKay's, Fraser's, and Ross' (1970) finding that multiple classification precedes multiple seriation. This apparent contradiction is partially clarified when it is understood that what MacKay *et al.* found was that (1) a matrix composed of descrete categories in both directions—Smedslund's task of multiplication of classes—is of equivalent difficulty to one constructed of discrete categories in one direction and a relational variable in another—Smedslund's task of multiplicative relations, and that (2) both are developmentally an earlier acquisition than the ability to construct a matrix composed of relational categories in both directions. These differing definitions of multiplicative relations point to the " . . . complex problem of the operational distinction between classes [classification] and relations [seriation] as psychological phenomenon" (Smedslund, 1964, p. 31).

Number Concepts

"For Piaget, the concept of number is not based on images or on mere ability to use symbols verbally, but on the formation and systemization in the mind of the two operations; classification and seriation" (Lovell, 1961, p. 61). Accordingly, the concept of number develops in children in the following manner. At about age 6 years, the child has a vague notion of the concept of number. This concept is to a large extent determined by what he perceives. If a perceived configuration changes, the child's numerical judgments concerning it are likely to change. This stage is also clearly egocentric and is called by Piaget the stage of "global comparisons." This is followed by an intuitive stage in which the child starts to realize judgments cannot simply be made in terms of perceived attributes of objects. In the third stage, the child becomes completely *operational* and is no longer bound to perceived patterns. Judgments are no longer egocentric. Specifically, the operations which are necessary to an understanding of number are (1) the ability to deal with the equivalence of cardinal classes in terms of one-to-one correspondence, and (2) the ability to deal with transitive relations such as, *greater than* and *less than,* which underlies the concept of ordinal number. The evolution of number concepts is also related to the acquisition of conservation of quantity, since the child can only understand quantification (numbers) when he is capable of perceiving wholes (conservation).

Wohlwill (1960) conducted a scalogram analysis of the development of the number concept. The subjects, 35 boys and 37 girls divided equally between the ages of 4-0 to 7-0, were tested on eight matching from sample tasks of increasing abstractness. These tasks were not counterbalanced. The results yielded a scale of numerical tasks based on the difficulty of the tasks. The resulting sequence was as follows: (A) elimination of perceptual cues, (B) abstraction, (C) memory, (D) addition and subtraction, (E) extension, (F) conservation, and (G) ordinal-cardinal correspondence. Although the tasks generally followed this orderly pattern of increasing difficulty, the relationship between the items was far from perfect; i.e., some children were able to complete harder tasks before easier ones. Using the results obtained, Wohlwill described the three stages in the process of number concept formation as being (1) response to perceptual cues, (2) response to mediating structures, and (3) symbolic mediation.

In a study of five different number concepts, Dodwell (1960) tested 240 kindergarten through second grade children, ages 5-2 to 8-7 years. The five tasks used included (1) relation of perceived size to number, (2) provoked correspondence, (3) unprovoked correspondence, (4) seriation, and (5) cardination and ordination. Of the three stages—global comparison, intuitive judgments, and concrete operations—the intuitive stage was most prevalent. The stages found in testing did not follow the sequence which Piagetian theory

postulates. Rather, individual children were inconsistent in the level of responses they made to the various test items. These results indicated an absence of strong sequential development. Dodwell felt these results could be a function of learning without adequate response generalization. Dodwell (1961) conducted another number study using 250 kindergarten through first grade children and again found that the children's responses to the number concept tests do not show the strong sequential dependencies that are predicted from Piaget's theory.

Dodwell (1962) studied 60 children, ages 5-2 to 8-8, testing them on number concepts and additive composition of classes. The results of this study indicated that children's answers followed Piaget's stages of number concept development: global comparison, intuitive judgment, and operational judgment. Although they do develop in the same age range, he found that, to a large extent, hierarchical classification appeared to develop independently of the understanding of cardinal number. However, there is some question, in view of the observed difficulty of this item (see Kofsky, 1966), as to whether the selection of the class inclusion problem was most appropriate.

Elkind (1964), as briefly considered above, replicated Piaget's original experiments in discrimination, seriation, and numeration. The original experiments were designed to demonstrate the stages in the development of these content domains, as well as to demonstrate the development of overall conceptual abilities that transcend the mastery of any particular task. It is this overall ability that accounts for similarities in the development of diverse conceptions. The subjects were 30 children at each age level from 4 to 6 years. In agreement with Piaget's results, Elkind found an increase with age in the mean score on the three sets of tasks: discrimination, seriation, and numeration. He also found the relative difficulty of the three tests and of the individual items within the tests to be consistent with Piaget's results. The order of increasing difficulty was: discrimination items, seriation items, and numeration items. In agreement with Piaget's findings, the developmental sequence followed the stages of global comparison, intuitive representation, and operational judgment.

The findings of these studies on the development of the concept of number appear to be consistent with Piaget's basic postulates concerning the acquisition of the number concept and the developmental dependency of the number concepts on the prerequisite concepts of seriation and classification (with the possible exception of the findings of Dodwell, 1962). Piaget (1952) has proposed that this conceptualizing ability derives from the internalization of the child's own actions upon objectives; and that, depending upon the contents to which they are applied, these internalized actions simultaneously give rise to classes, relations, and numbers.

Transitivity

Also relevant to any discussion of the present research questions is the literature concerning (1) the development of the relationship between transitivity and seriation, and (2) the development of the relationship between transitivity and conservation. A child is said to have concrete transitivity of length, for example, when from the observations that "A is longer than B," and that "B is longer than C," he is able to infer that "A must be longer than C." In the Piagetian literature, transitivity is considered to be a measure of inferential reasoning.

Piaget, Inhelder, and Szeminska (1960) maintained that the understanding of serial order is a prerequisite to transitivity of size relationships—the notion of a middle term ensues from seriation and is, therefore, a prerequisite to the understanding of transitivity. Piaget and Inhelder (1962) hypothesized that the principles of conservation and transitivity develop simultaneously with respect to a given content area. This section of

the review will discuss (1) research pertaining to transitivity of length, (2) research pertaining to transitivity of weight, and (3) research pertaining to the relationship of transitivity to seriation and conservation.

In Piaget's first studies relevant to the transitivity of length, children were asked to build, with blocks, a tower equal in height to a tower already built by the experimenter. The given tower stood on a table that was higher than the table on which the child was to build his tower. Observation of children's procedures in evaluating the relative heights of the towers showed a very gradual change towards adequate measurement. The majority of children appeared to understand and master the measuring technique only after 7 or 8 years (Smedslund, 1963).

Braine (1959) contended that in Piaget's studies of transitivity he fails to eliminate important variables that are not involved in the definition of the process he sets out to investigate. In Piaget's studies of transitivity of length, measures of the child's ability to make an inferential response are not distinguished from his ability to accurately use measuring instruments or from his verbal skills essential to conceptual understanding within the Piagetian task format. In a paradigm controlling for these factors, Braine investigated (a) the development of the inferential response (as indicated by judgments of transitivity), (b) the development of order discrimination, and (c) the developmental relationship between these two acquisitions. The subjects, 18 boys and 23 girls ranging in age from 3-6 to 7-0, were given transitivity and order discrimination tasks in counterbalanced order. Braine's results provided strong support for Piaget's concept of developmental stages. However, with these controlled nonverbal procedures, he found that both the inferential response and order discrimination ability were elicited approximately 2 years before Piaget claims they first became available to children. Piaget's postulate that order discrimination and the inferential response develop simultaneously was empirically verified. The course of development of the two tasks was virtually identical over the age range studied.

Smedslund (1963) agreed with Braine's (1959) criticisms of Piaget's experimental procedures. However, he also maintained that Braine's technique failed to control for nontransitive hypotheses—correct judgments of transitivity may have been based on something other than inference (such as guessing, or perceptual discrimination). Consequently, Smedslund developed a new test of transitivity designed to control for the possibility of judgments based on nontransitive hypotheses. Subjects were 107 children ranging in age from 4-0 to 10-0. Smedslund's data, like Braine's, strongly supported Piaget's theory of developmental stages in the growth of transitivity. Concerning the average age of acquisition of transitivity of length, the data supported Piaget, rather than Braine; i.e., transitivity usually occurs at about 8 years of age. All subjects who were diagnosed as having transitivity also had conservation, and most children who were diagnosed as not having transitivity did not have conservation.

Replying to Smedslund (1963), Braine (1964) argued that "the probable failure of Smedslund's younger subjects to understand what was required of them means that the experiment cannot claim to reveal the earliest age at which the average child grasps the transitivity of length" (p. 800). Braine maintained that while Smedslund's younger subjects probably interpreted the question "Which one is longer?" to mean, incorrectly, "Which one *looks* longer?" the older subjects interpreted it correctly as "Which one is *really* longer?" Braine also maintained that Smedslund's argument that his (Braine's) subjects used *nontransitive hypotheses* is far-fetched. He presented control data that provide evidence that such nontransitive hypotheses were not used by subjects in the task. Braine reaffirmed the conclusion to his original experiment that the relation *longer than* becomes transitive for children at least 2 years earlier than the age found with classical Piagetian techniques.

Continuing this controversy, Smedslund (1965) maintained that Braine's (1964) conclusions must be modified. After reanalyzing Braine's data, he concluded that the results were highly ambiguous and that "there exists no compelling evidence for or against the assumption that the performance of Braine's subjects in measurement trials was based only on nontransitive hypotheses" (p. 580). Both Smedslund and Braine agreed that methodologically adequate and more relevant data are needed.

Investigating judgments of transitivity in more detail, Murray and Youniss (1968) argued that in the typical situation evaluating transitivity of length a correct judgment is not necessarily a transitive one but might merely reflect the child's consistency in selecting a longer stick. The conclusion that A > C can be due to the fact that of the two possible choice sticks, A and C, only A has been identified as longer. In order to evaluate the presence of inferential judgments they compared the A > B > C paradigm to two other paradigms that are less amenable to noninferential solutions: A > B = C and A = B > C. They also evaluated the relationship between seriation and transitivity. The subjects, 24 boys and 24 girls from each grade level, kindergarten through second, were each tested individually: first on the three transitivity tasks and then on a simple seriation taks. The children were able to correctly evaluate the A > B > C paradigm before they could correctly respond to the two comparison paradigms. Based on these results, Murray and Youniss concluded that one should question whether the A > B > C paradigm, open to nontransitive solutions, measures the child's ability to comprehend a logical inference. Their data support the Piaget, Inhelder, and Szeminska (1960) hypothesis that seriation, which develops before transitivity, is an operational forerunner to the understanding of transitivity.

Continuing their investigation of transitive inference, Youniss and Murray (1970) investigated whether children show inferential behavior when methodological controls allow measurement but do not allow differential size designation prior to the choice trial. Subjects, 32 kindergarten/first graders, and 32 third graders were tested on three transitive paradigms and a control condition. These paradigms, presenting the same relations employed by Murray and Youniss (1968), controlled for size designation of both choice sticks used. After the transitivity trials, each child was tested on a task of serial ordering. Results indicated that younger subjects (CA 6) consistently failed to make inferential judgments. Older subjects (CA 8) were moderately successful in making inferential judgments. Based on these controlled procedures, Youniss and Murray supported Smedslund (1963) and Piaget's, Inhelder's, and Szeminska's (1960) conclusions that 8 years of age is a *threshold* period when transitive inference approaches stabilization. Although a number of subjects who demonstrated transitivity judgments failed the seriation task, overall the data supported Piaget's, Inhelder's, and Szeminska's (1960) hypothesis that seriation develops before transitivity.

A number of researchers, concerned with the relationship between transitivity and conservation, have investigated Piaget's and Inhelder's (1962) hypothesis that the organization of logical operations (reflected in transitivity) and of infralogical operations (reflected in conservation), dealing with the same content area, develop simultaneously. Smedslund (1961), testing 135 children between 5-6 and 7-0, found that while 20 percent had conservation of weight, only one percent had transitivity of weight. Similarly, Kooistra (1965), testing 12 boys and 12 girls at each age level from 4 through 7, found that conservation of weight occurs before transitivity of weight. Based on a comprehensive training study, Garcez (as cited in Beilin, 1970) similarly concluded that the operational achievement of conservation is needed for transitivity. On the other hand, Lovell and Ogilvie (1961) in their study of conservation of weight, cited above, found, that among the 262 children participating in this section of the study, both conservers and nonconservers could perform the logical operation of transitivity. They found no significant

differences between these two groups. Lovell and Ogilvie concluded that judgments of transitivity do not depend upon the ability to conserve.

In conclusion, these studies of the development of the concept of transitivity offer strong support for Piaget's concept of developmental stages and for his general conception of the nature of developing functions (Braine, 1959, 1964; Smedslund, 1963). Evaluating the relationship between transitivity and seriation, Murray and Youniss (1968) found clear support for Piaget's, Inhelder's, and Szeminska's (1960) hypothesis that the understanding of serial order is a prerequisite to transitivity of size relationships. On the other hand, Braine (1959) found that order discrimination and transitivity develop simultaneously. This apparent contradiction may be clarified by the fact that the criteria for transitive judgments set by Murray and Youniss were more stringent than the criteria set by Braine. It is possible that while the ability to solve the A > B > C paradigm (possibly open to nontransitive solutions) develops simultaneously with serial ordering (Braine, 1959), both are operational forerunners to paradigms less open to noninferential solutions.

In contradiction to Piaget's and Inhelder's (1962) hypothesis that the principles of conservation and transitivity develop simultaneously with respect to a given content area, Smedslund (1963) found that conservation of length develops before transitivity of length. Similarly, Smedslund (1961) Kooistra (1965) and Garcez (1969) found that conservation of weight precedes transitivity of weight. On the other hand, Lovell and Ogilvie (1961) offered evidence in support of the hypothesis that conservation and transitivity develop simultaneously. However, it is quite likely that their results differ from the others because the task they used to measure transitivity was potentially open to noninferential hypotheses (see Murray & Youniss, 1968).

As evident from both these conflicting interpretations of transitivity and the Braine (1959, 1964) - Smedslund (1963, 1965) controversy summarized above, existing data concerning the presence of transitivity (and, by implication, inferential reasoning) are highly ambiguous. Gruen (1966) has pointed out that this ambiguity has arisen because researchers, such as Braine and Smedslund, are using different criteria for diagnosing the presence or absence of transitivity. These differing criteria reflect a disagreement on the nature of the conditions which are both necessary and sufficient for the concept of transitivity to be formed. Before the processes related to the development of the concept of transitivity can be clearly established, researchers will have to agree upon an operational definition of transitivity, as a fundamental prerequisite to the specification of the conditions necessary and sufficient for the development of the concept.

Conclusions

Having briefly reviewed a number of cross-sectional studies investigating questions related to Piaget's construct of stages, it is now possible to evaluate the extent to which the current literature confirms or refutes (1) the postulate of a universally invariant stage sequence, and (2) the postulate of correspondence within stages.

Overall, these studies support Piaget's hypothesis that the steps marking the development of a concept appear according to an orderly progression. However, although it appears that there is a regular sequence in which concepts are acquired by the child, the evidence does not support the assumption that this order is universally invariant. For each of the concepts reviewed: quantity, identity, and equivalence, spatial-geometric, classification, seriation, number, and transitivity, the data indicate this regular, but not invariant, developmental progression. One possible explanation of this sequencing is the competence-performance model of cognitive development suggested by Favell and Wholwill (1969) which will be discussed later in the conclusion to this review.

In evaluating the hypothesis of stage correspondence, Wohlwill's (1963) conclusions were still most applicable.

> The evidence with regard to this question, it seems fair to state, does not bear out Piaget's contentions with any degree of regularity. It suggests, rather, that the situation is far more complex than Piaget's theory allows for. To be sure, the results of a few studies have shown a fairly high degree of consistency in the performance of the same children on two or more related tasks . . . the case for the negative is, however, rather more fully documented . . . . It seems that consistency may well be the hobgoblin of some psychologists, but hardly appears to preoccupy the small minds of children serving as subjects in Piaget-type studies (p. 258).

However, although current research supports the conclusion that (1) concepts develop through a sequence of regular, but not invariant, steps, and that (2) correspondence within stages is a gross simplification of the developmental process of cognition, these conclusions can only be regarded as highly tentative. Each of the studies reported, no matter how conscientious the researcher, is still open to questions as to the extent to which both the independent and the dependent variables are reliable and/or valid. As Braine (1959) has commented, ". . . in designing his experiments, Piaget fails to eliminate important variables which are not involved in the definition of the process he sets out to investigate" (p. 16).

Many of these methodological problems arise because researchers investigating Piagetian theory (1) differ in the experimental procedures they deem appropriate for assessing cognitive processes, and (2) disagree on the very nature of these processes. As Braine (1959) explained, in current psychological theory intellectual processes have the theoretical status of hypothetical constructs. These processes, as hypothetical constructs, require two types of specification. First, they must be specified in terms of their relationship to other processes within the theoretical system. Second, they require (a) specification of the experimental operations through which they may be elicited, and (b) specification of the characteristics of the responses that verify their presence.

While the intellectual processes defined by Piaget meet this first requirement of specified interrelationships among the processes of the system, there is little in the Piagetian theory of cognitive development that specifies, in detail, experimental operations or response criteria. While it is not within the scope of this review to provide a detailed analysis of the methodological confounds present in Piagetian based research, examples of a few of these methodological problems will be presented. (Although these methodological considerations are discussed in terms of the cross-sectional studies reported above, they are also relevant to the Piagetian training literature which is presented in the next section.)

Major reasons for lack of agreement on questions concerning stage sequence and stage correspondence fall into two categories: (1) operational variables, and (2) subject variables.

Operational Variables

Operational Definitions. Differing experimental operations, based on varying assumptions of the underlying psychological processes, are frequently used to define the same *operation* (ability). For example, while Smedslund (1964) and MacKay, Fraser, and Ross (1970) both investigated the concept of multiple relations, their operational definitions of the terms were far from parallel. It certainly is not surprising that, using such different experimental operations, they come to conflicting conclusions. Similarly, the

Braine (1959, 1964) - Smedslund (1963, 1965) controversy is related to differing operational definitions of transitivity.

Confounding Variables. In evaluating the results of experimental operations, it is also necessary to consider the problem of disentangling the variable to be measured from confounding variables. For example, Braine (1959) believed that in evaluating judgments of transitivity, Piaget's measures are influenced by the subject's ability to accurately use measuring instruments, as well as by his verbal skills. Similarly, Kofsky's (1966) measures of conservation and hierarchical classification may be confounded by the inclusion of nonsense syllables in the task format. Measures of horizontality that use water-line bottle tasks may reflect the child's comprehension of the properties of fluids more than his understanding of spatial coordinates.

Task Format. Even when the tasks used provide comparatively *nonconfounded* measures of the variables in question, results are still dependent upon the *specific* task format employed. Braine (1959) concluded that ". . . the accuracy of length judgment in young children varies with the nature and the spatial arrangement of the stimuli judged" (p. 7). Similarly, in studying conservation judgments, Schwartz and Scholnick (1970) found that children attend to some cues more than others, and that ". . . the more dimensions in which the standard and transformed stimuli differ from each other, the greater the difficulty of judgment" (p. 702). In fact, in studying conservation behaviors, Uzgiris (1964) found a three-way material x quantity x age interaction. Studying the concept of space, Dodwell (1963) found a general lack of consistency in responses to items that merely represented variations of the task or problem. Another task variable influencing performance, one that is rarely considered, is the affective response the task arouses in the subject. Looking at this variable, Saltz and Hamilton (1968) found that children are more likely to conserve under positively evaluated transformations than under negatively evaluated transformations.

Experimental Replication. Inherent in the Piagetian *clinical* approach is personalized interaction between the subject and the experimenter. While this situation maximizes rapport and, consequently, the child's ability to achieve, it does not lead to findings that can be verified through exact replication. For example, MacKay, Fraser, and Ross (1970), in describing a Piagetian study of classification (Inhelder & Piaget, 1964) explained that ". . . the child is asked to arrange the pictures as he thinks they ought to be arranged. The rest of the procedure is unclear. For example, the *E* may help these children who do not appear to grasp the solution by 'filling in' the first vertical and horizontal edges" (p. 788). Similarly, Papalia and Hooper (1971) in their investigation of identity and equivalence conservation explained, that while an attempt was made to actively involve each subject in the task situation, ". . . the experimenter assisted subjects in completing the experimental manipulations" (p. 11). No further explanations were given.

Data Analysis. Once the data have been collected, different researchers may interpret the results in different ways. They may use (a) different criteria for interpreting the same responses, or (b) different statistical methods for analyzing the same data. Gruen (1966) used two different sets of criteria to analyze the same study of number conservation (Gruen, 1965). Using one set of criteria (cf. Smedslund, 1963), 161 responses were classified as conserving. When other criteria were used (cf. Bruner, 1964), 205 responses were so classified. The difference between these two sets of results proved to be significant.

A number of correlational techniques have been used in analyzing Piagetian studies of cognitive development. In interpreting these studies, the reader must be aware that, as has frequently been pointed out, different statistical analysis of the same data may yield significantly different results (Bentler, 1971; Walster & Cleary, 1970). The appropriateness of the application of some of these techniques may be open to question.[2]

Subject Variables

Language. Studies that present instructions verbally and/or ask for verbal responses may be significantly influenced by the subject's language skills. Questions arise such as: Did each child understand the instructions? Did all subjects interpret the instructions in the same way? How accurately did the child's answers reflect his thoughts? As Braine (1959) stated, "Vocabulary development may well be a factor in many of Piaget's experiments . . . . No theory which postulates levels of conceptual development can be regarded as definitely established when the supporting data are obtained through extensive verbal communication with *Ss* who differ in their ability to verbalize" (p. 7). For example, as mentioned in the section on transitivity, the question "Which one is longer?" may be interpreted as "Which one *looks* longer?" or "Which one is *really* longer?" Similarly, the criterial terms employed; e.g., "more," "same," or "less" may not be uniformly understood by the subjects (Griffiths, Shantz, & Sigel, 1967). Differing results are also likely to occur if the child is asked to respond in a verbal manner rather than in a nonverbal manner. In fact, Kofsky (1966) suggests that ". . . a task which requires verbalization from the child is inherently different from a task that requires manipulation of material no matter how similar the content of the two" (p. 202). In their scalogram analysis of quantity conservation, Schwartz and Scholnick (1970) found that including verbal responses in the scale added a new source of variation.

Developmental Status. A most obvious variable, but one that is frequently not taken into consideration, is the child's development status—the abilities he already has. Although there is an overall relationship between developmental status and age (e.g., a preschooler would not yet be capable of formal operational thought), this relationship is far from exact. Considering the wide range of individual differences, grouping subjects according to age may, under many circumstances, be misleading. As will be pointed out in the following section on training studies, it is possible that grouping children according to developmental status would lead to clearer results. For example, to take a group of children of a given age; train them on a task; find no significant difference between the trained subjects and controls; and, therefore, to claim that training has no effect, can be quite misleading. What these results may indicate is that given a group of subjects who have not yet mastered W, X, or Y, training on Z has no effect. It does not indicate that training would not be possible under more appropriate conditions (subjects who have mastered W, X, and Y conditions). Gagne (1968) concluded that "Stages of development are not related to age except in the sense that learning takes time" (p. 188). Rather, "In an over simplified way, it may be said that the stage of intellectual development depends upon what the learner knows already and how much he has yet to learn in order to achieve some particular goal" (p. 189).

Experience. A major factor influencing the child's developmental status and, consequently, his performance, is his experiential background. Any study must be interpreted in terms of the population sampled—extreme care must be taken in generalizing from a selected group of children.

For instance, in considering Murray's (1970) data on identity and equivalence conservation, one must keep in mind that his subjects were all enrolled in a special program for teaching mathematics and science. Another experiential factor influencing performance that investigators rarely report is the child's previous experience as an experimental subject. It is generally impossible to know if subjects are naive or have had previous experience in related settings.

RESEARCH UTILIZING REPEATED MEASUREMENT DESIGNS

The research which has made use of repeated measurement assessment designs falls into two general categories: (1) conventional longitudinal normative research, and

(2) training or enrichment studies. Very few longitudinal assessments of Piagetian concept acquisition are currently available. This is probably most unfortunate since longitudinal assessment designs, assuming such problems as sampling bias and repeated measurement effects can be controlled, provide particularly valuable data concerning individual rates of development (Baltes, 1968; Schaie, 1965; Wohlwill, 1970a). Ideally the normative longitudinal assessment approach should be combined with experimental intervention research as exemplified by the training attempts covered later in the present review (Hooper, 1971; Wohlwill, Devoe, & Fusaro, 1971).

Longitudinal Research

Inhelder and Noelting (in Skard *et al.*, 1960) conducted a pilot longitudinal investigation that involved testing four groups of five children, aged 5, 7, 9, and 12 years at the onset of the study, for a period of 3 to 5 years. The task series included the established Piagetian concrete and formal stage measures of conservation, and logical reasoning in the content areas of space, time, causality, number, and probability. The results from the initial 18-months observation interval indicated essential support for the earlier, cross-sectionally derived findings. No cases of developmental regression (lower level functioning by a child at later testing points) were observed (Piaget, 1966). Certain distinctions were found in the longitudinal data as Inhelder and Noelting concluded:

> In other respects we observe certain differences between the results obtained by former methods and the longitudinal one without being able to discern in detail what role can be attributed to the method and what to the evolutionary process itself: the elaboration of certain notions and of methods of reasoning is slightly accelerated in our subjects as compared to the control groups. This acceleration, due to general or specific practice, does not seem the same at all levels. When the child is given a series of reasoning tests, we notice a tendency to homogeneity and generalization of behavior which, though slight in the course of the formation of a structure, manifests itself more clearly when the structure has been achieved (p. 253).

Almy, Chittenden, and Miller (1966) conducted a combined cross-sectional and longitudinal study assessing a number of Piagetian concept tasks and conventional achievement measures in a sample of lower and middle socioeconomic class children. The Piagetian tasks included conservation of the equality of two sets of blocks subjected to two transformations, conservation of number following counting of the arrays, and conservation of continuous liquid quantity. The cross-sectional data (152 middle class and 93 lower class subjects) indicated that the number of nonconserving children systematically decreased from kindergarten to second grade. Social class differences were shown by the number of middle class children who conserved on all three tasks at the second grade level, 48 percent, compared to 23 percent for the lower class children.

The longitudinal analysis also indicated a relative performance superiority for the middle class children; the point at which 25 percent of the respective subsamples conserve on all three tasks appears approximately 1 year later for the lower class subjects. The acquisition sequence for the various task formats was very similar for the two social class samples and closely paralleled the cross-sectional patterns. The longitudinal study highlighted the transitional nature of the age period from 5 through 7 years. As Piaget has indicated (Piaget & Inhelder, 1962), a child may give evidence of understanding conservation but fail to maintain this conceptual mastery when presented with more extreme perceptual alterations after more extensive questions or countersuggestions. Approximately one-half of the children, at least at one point in the longitudinal series of interviews, *regressed* from what ostensibly appeared to be an understanding of a particular conservation task at an earlier testing interval.

Somewhat similar results were obtained in a longitudinal case study investigation by Deal (1969). Ten children, ages 3 to 5 years old at the beginning of the study, were annually observed over a 3-year interval on a series of vocabulary, numerical correspondence, and conservation items. In general, the ability to complete these items was shown to increase over the assessment interval especially between the kindergarten and first grade years. As was found in the Almy *et al.* (1966) study, progress for individual children was marked by alternating periods of stability and marked acceleration, a sizeable proportion of the subjects showed regression on certain test items.

Wohlwill and his associates (Wohlwill, Fusaro, & Devoe, 1969; Wohlwill, Devoe, & Fusaro, 1971) carried out a commendable longitudinal study that covered an assessment period of 2½ years. Subjects from lower and upper-middle social classes included 36 children initially tested in kindergarten and 38 children initially tested at the first grade level. The various task series consisted of (1) spontaneous grouping, for sets of stimuli permitting multiple alternative modes of classification, (2) spontaneous measurement that involved a set of situations calling for activities of dimensions comparison, counting, and measuring, (3) spontaneous seriation—ordering a set of stimuli varying on the length dimension, (4) conservation measures, and (5) measures of the understanding of class inclusion and class intersection.

The general result patterns of this study were summarized as follows:

> With few exceptions, these various measures all underwent substantial changes over the course of this period, generally indicating increased skills in dealing with conceptual or quantitative problems, increased activity manifested by the child in his approach to these problems, and improved understanding of class and dimensional concepts. These changes are hardly surprising, forming part of the overall process of the child's cognitive development, but the fact that as considerable changes as those found in this study do occur over the 18-month span between the initial and the final tests of this study once again serves to emphasize the nature of this as a critical period in the intellectual development of the child.
>
> Chief interest in this study centered, however, on the interrelationships between the developmental changes observed on the various tasks, and particularly between the measures of spontaneous cognitive activity, on the one hand, and of concrete operations on the other. When studied cross-sectionally, i.e., for each test individually, relationships that were moderate in magnitude at best were found; sharing in the typical limitations of correlational information, they did not contribute materially to our understanding of the developmental processes at work in the mediation of the observed age changes.
>
> The picture was altered to a degree, once a more dynamic mode of analysis was employed, interrelating measures obtained for one set of variables at one point in time either with those for another set of variables at a later test, or with the *changes* found with respect to the second set of variables between the first and second tests. Thus, there was some evidence that the degree to which the child exhibited spontaneous measuring activity on the first test was predictive of the change that would be observed in his conservation performance between the first and second tests—i.e., for children performing at a given level of conservation on Test 1, those who changed to a higher level on Test 2 were found to have had significantly higher measurement scores on Test 1, in comparison with those who failed to show an improvement in conservation.
>
> Certain of the measures obtained from a spontaneous object-grouping task (The Block-Placement Test) yielded similar relationships to changes observed with respect to performance on class-intersection tasks, although in this instance the overall picture was more of a parallel development, or of development with respect to one set of measures initially preceding the second, but the latter subsequently "catching up" with or even moving ahead of the first. (Some slight evidence of such a reciprocal relationship was found for the measurement-conservation re-

> lationship as well, to the extent that improvement over the upper range of the measurement scale, involving true measurement operations, based on either units of measurement or the use of an external standard to reproduce a given distance, appeared to follow the attainment of conservation) . . . .
>
> A final word is in order concerning the role of experience in regard to this problem, and the concept of "spontaneous" experience in particular. The stress on the child's spontaneous activities, which determined the nature and relatively unstructured mode of presentation of the tasks devised to measure the cognitive activities, derives from the assumption that conservation and similar concepts are not learned in the usual sense; i.e., as a result of specific training or practice, but are rather by-products of a much broader type of experience which is common to most if not all children during the age period under investigation. This experience may take a variety of specific forms, some of them purely self-initiated, as in the child's play activities around home, others elicited during the course of the child's participation in the work (and play) in school during Kindergarten and First Grade. The lack of any appreciable differences as a function of Kindergarten attendance, . . . and absence from the curriculum in these grades of any units dealing directly with the type of concepts or activities studied in this investigation (excepting incidental exercises involving object-grouping) reinforces an argument presented here for a broad, unprogrammed conception of the role of experience in this realm, and for conceiving of it as operating via the intermediary of a large variety of specific alternative acitivities on the part of the child, in contrast to the response- or skill-acquisition model favored by some behavioristically inclined theorists (e.g., Gagne) in dealing with this problem (Wohlwill, Devoe, & Fusaro, 1971, p. 38-39).

It should be pointed out that the Wohlwill *et al.* longitudinal results could have been confounded to an unspecified extent by repeated testing *carry-over* effects. While comparable cross-sectional samples were not systematically assessed at each of the measurement points (Baltes, 1968), an age-matched (12 younger and 18 older subjects) cross-sectional comparison group was tested at the conclusion of the overall longitudinal study. Subsequent comparison analyses failed to indicate any uniform performance superiority for the longitudinal subjects, thus indicating an absence of repeated testing effects.

Training Research

Also relevant to an evaluation of the dual stage assumptions presently under consideration.[3] is the extensive literature concerning attempts to experimentally induce logical operations functioning. The assumption of an invariant stage sequence can form the basis for a systematic behavioral hierarchy in curriculum design (Hooper 1968; Parker, in press). This is exemplified in the preschool education programs of Kamii and her associates that emphasize the mastery of initial preoperational stage experiences as fundamental prerequisites to the successful acquisition of concrete operations functioning (Kamii, in press; Kamii & Radin, 1970). For content, specific domains within the general concrete operations period, instructional sequences may be patterned after the normative developmental progressions. Thus, Hooper (in press), in designing curriculum programs for preschool children, utilized Elkind's (1964) task acquisition sequence for seriation and Kofsky's (1966) task acquisition sequence for classification. The seriation program (absolute comparisons, relative comparisons, serial correspondence, and multiple seriation) proved to be notably effective. Similar task analysis approaches have been found to be effective instructional designs for length and weight conservation (Kingsley & Hall, 1967) and number conservation (Gelman, 1969).

In principle, any of the cases of developmental priority (conceptual linkage) described above could be used as instructional formats. Training or enrichment experiences focused upon the earlier appearing conceptual ability would be expected to influence the acquisition of the later task domains. The identity and equivalence conservation, conservation

and transitivity, and distance conservation-spatial coordinates cases represent potential areas for application of this approach. The prerequisite relationships between seriation and measurement skills and subsequent conservation acquisition demonstrated in the longitudinal research of Wohlwill, Fusaros, and Devoe (1969) also present obvious implications for sequential instruction applications.

The relevance of the extant training literature to the question of within-stage correspondence or convergence centers upon those studies that have utilized the well known transfer of training paradigms. In brief, this involves pretesting groups of subjects on a series of stage-related task settings. Training is then conducted on part of the task arrays. Posttesting indicates the degree of specific transfer; i.e., performance superiority on the instructional tasks, and the degree of nonspecific or far-transfer to the nontrained but theoretically related task formats (Beilin, 1970; Brainerd & Allen, 1971; Goulet, 1971B; Hooper, 1971).[4] It is the latter type of transfer, of course, which is of primary importance to the issue of within-stage correspondence. (The logical groupings of the concrete operations period appear to be ideal candidates for this type of experimental stage assessment—see Flavell, 1970b; Pinard & Laurendeau, 1969).

The most popular content domain for training endeavors has clearly been number conservation. Positive nonspecific transfer is found in the research of Gelman (1969), Gruen (1965), and Rothenberg and Orost (1969). In the Gelman (1969) study, discrimination learning set training was used with groups of 5-year-old children who were classified as nonconservers of length, number, mass, and liquid quantity. Training sessions focused upon *both* the number and length cases. Posttests indicated near perfect specific transfer and approximately 60 percent nonspecific (mass and liquid quantity) transfer of training. These results were stable over a 2-to 3-week period. Gruen (1965) found a combination of verbal pretraining (comprehension of relational terms) and cognitive conflict instruction to be partially effective in eliciting number conservation in children, 4-6 to 6-6 years old. Of the children who received instruction, 37 percent showed far-transfer to a length conservation task, and 26 percent to a continuous quantity (substance) conservation setting. Rothenberg and Orost (1969) utilized multiple training strategies that included reinforced counting, addition and subtraction experiences, one-to-one correspondences, reversibility of transformations, and emphasis upon the proper use and understanding of the relational terms "more" and "same." In this manner, they taught kindergarten children the probable steps necessary for number conservation. The instructional experiences were found to generalize to a discontinuous quantity conservation transfer task for immediate and delayed (3-month interval) posttests.

In contrast to these results, an absence of far-transfer following number conservation training was found by Beilin (1965), Peters (1970), Wallach, Wall, and Anderson (1967), and Wohlwill and Lowe (1962). In the Beilin (1965) study, children, median age 5-4, were trained in either number or length conservation by one of the following instructional techniques: (1) nonverbal reinforcement, (2) verbal orientation, (3) verbal rule instruction, and (4) equilibration or cognitive conflict. Verbal rule instruction proved to be the most effective instructional procedure. Although there was some evidence for increased convergence (higher intercorrelations) between length and number conservation performances following training, there was little evidence of transfer to a quasiconservation area task. This latter task has substantially been found to be of significantly greater difficulty than conventional area conservation tasks (Beilin, 1966, 1969).

Peters (1970) evaluated the relative effects of noncued, visually cued, and verbal rule supplemented instruction on number conservation with groups of lower socioeconomic status kindergarten children (mean age 5-7). Verbal rule training was superior to the other techniques on the basis of immediate posttesting. Both verbally and visually cued subjects were significantly different from control subjects on delayed retention (2-week

interval). There was a lack of significant far-transfer to the conservation of differences and surface area conservation tasks.

In an examination of the role of reversibility, perceptual cues, and addition-subtraction schemata in number conservation acquisition, Wallach, Wall, and Anderson (1967) found significant specific training effects for a group of first grade children (average age 6-11). Number reversibility instruction was notably superior to addition-subtraction training. However, there was little nonspecific transfer to conservation of liquid quantity conservation. Wohlwill and Lowe (1962) compared the effectiveness of reinforced practice, addition-subtraction experiences, and counting as means of inducing number conservation in a nonverbal assessment format. For a sample of children (average age 5-10), addition-subtraction training was relatively superior to the other instructional procedures. However, none of the experimental groups differed significantly from the control group performances, and no transfer was shown for a conventional verbal number conservation task format.

A similar mixed picture exists for training attempts in the other concrete operations content areas. Beilin and Franklin (1962) trained first and third grade children on length and area conservation task requirements and related measurement skills. Evidence of transfer to the length task was particularly notable in the third grade experimental subsample. Training induced transfer to the more difficult conservation of area task was present only for the older third grade children. Kingsley and Hall (1967) utilized a learning set approach in a combined weight and length conservation training program. The experimental subjects (kindergarten and first grade children) demonstrated significant specific learning and also increased skill on the nonspecific transfer task of conservation of continuous quantity (substance). This latter form of conservation typically appears developmentally earlier than the weight case; i.e., the commonly found substance-weight-volume horizontal decalage.

Murray (1968) used the Muller-Lyer Illusion in a cognitive conflict training procedure for length conservation. Experimental subjects showed significant improvement on the length tasks as compared to controls. Older children (average age 7-9) demonstrated greater gains than those shown by younger children (average age 5-9). There was no far-transfer to an area conservation task. Smedslund (1961) trained subjects on the conservation of weight task and found some evidence for specific transfer on posttesting. However, there was no transfer to a weight transitivity task setting.

Bearison (1969), in a study which examined the role of numeration and comparison of discrete units, found that training experiences facilitated acquisition of continuous quantity conservation (liquid) and transferred to conservation of mass, number, length, and area. The experimental children (average age 5-10) maintained their superiority over a 7-month delayed posttest interval. Their conservation explanations were analogous to those elicited from a group of *natural* (nonexperimental) conserving children.

A number of related studies (Hooper, in press; Shantz & Sigel, 1967; Sigel, Roeper, & Hooper, 1966) have studied the interrelationship among various skills of the period of concrete operations, including, multiple classification and relationality, reversibility, and conservation. Sigel, Roeper, and Hooper (1966) gave gifted preschool children (average Stanford-Binet IQ 143) structured small group experiences in multiple labeling of stimulus attributes, multiplicative classification and relationality, and a concluding session concerned with reversibility aspects. Significant nonspecific transfer effects were shown by the experimental groups' superiority on posttests of substance and weight conservation.

In an extensive follow-up investigation, Shantz and Sigel (1967) compared the effects of multiple labeling-classification instruction, and discrimination-memory training. The subjects, kindergarten children, were trained in small group settings, six children

and one teacher in each group. The two training conditions were of equal duration. Posttesting revealed very similar results for both instructional conditions (a comparison control group was not included). There were no differences between the two training procedures on tasks of reversal of spatial order, multiple seriation, or multiple classification (the latter task would represent specific near-transfer for the classification trained children). Both instructional techniques resulted in significant increases in quantity and number conservation, thus demonstrating nonspecific far-transfer training effects.

Hooper (in press) evaluated the relative effectiveness of three separate curriculum programs: multiple labeling/classification, seriation, and memory-discrimination, with groups of average age 3-6 and 4-6 years. Each training sequence consisted of twelve 20- to 30-minute sessions of teacher directed small group activities. Assessment results, in a posttest-only design, indicated positive specific transfer only for the children trained on seriation. These instructional effects were most notable for the older children. little difference in the classification or memory discrimination task scores among the various treatment and control groups. Finally, in contrast to the Shantz and Sigel (1967) and Sigel, Roeper, and Hooper (1966) results reported above, none of the training conditions resulted in far-transfer to the continuous quantity (substance), number, or surface area conservation tasks.

Conclusions

In overview, this summary of selected research studies which have utilized transfer of training designs presents results that partially substantiate the within-stage correspondence assumption. With the exception of the Wohlwill and Lowe (1962) results and the first grade children's performances in the Beilin and Franklin (1962) study, all the training attempts demonstrated positive specific or near-transfer effects; i.e., significantly improved posttest performances on those task settings upon which training was directly focused. Insofar as nonspecific or far-transfer is concerned, six studies (Bearison, 1969; Gelman, 1969; Kingsley & Hall, 1967; Rothenberg & Orost, 1969; Shantz & Sigel, 1967; and Sigel, Roeper, & Hooper, 1966) demonstrated significant transfer, one study (Gruen, 1965) showed partial transfer effects, and six studies (Beilin, 1965; Hooper, in press; Murray, 1968; Peters, 1970; Smedslund, 1961; and Wallach, Wall, & Anderson, 1967) failed to reveal far-transfer. It is clear that whether or not within-stage correspondence, as measured by nonspecific transfer of training effects, is present depends upon the particular studies under discussion.

Any evaluation of the Piagetian inspired training research (see Beilin, 1970; Brainerd & Allen, 1971; and Goulet, 1971a, 1971b for recent reviews and discussions) must consider the interactive influences of three major factors: (1) the age or developmental status of the children involved, (2) the structural aspects or task requirements (degree of conceptual complexity) of the content domains in question, and (3) the type and magnitude of the training techniques or instructional procedures employed. Contrary to the conclusions of Brainerd and Allen (1971), the average age of the subjects receiving instruction appears to be an important determinant of training efficiency. The relatively greater performance increments for older as compared to younger subjects is directly shown in the studies of Beilin (1965), Beilin and Franklin (1962), Hooper (in press), and Murray (1968). Indirect evidence may be seen by comparing the age ranges (generally 6 years of age or younger) included in the majority of the studies presented in this review with the children's ages in the (a) Wallach, Wall, and Anderson (1967) study which found notable specific transfer for subjects aged 6-11, or (b) the Sigel, Roeper, and Hooper (1966) study which found notable nonspecific transfer for subjects with mental ages of approximately

6-6 to 7-6 years. It is clear that general instructional effectiveness is partially dependent upon the *developmental status* (not chronological age, per se) of the target children. In Piagetian terms, training is most likely to influence the behaviors of transitional or intermediate stage children.

Any curriculum designer, and certainly any classroom instructor, recognizes that the potential effectiveness of a particular teaching or enrichment strategy depends to a great degree upon the concept domain that is being taught. In accord with this, the present studies show that certain types of tasks; e.g., number or length conservation, are more amenable to structured training manipulation than are other developmentally more complex tasks; e.g., weight, volume, or area conservation. This becomes particularly important when we consider the problem of nonspecific or far-transfer effects. A number of the studies (Beilin, 1965; Gruen, 1965; Hooper, in press; and Murray, 1968), which trained on lower difficulty task formats and found specific transfer, failed to find far-transfer to conceptually more complex domains such as conservation of surface area. In contrast, the Kingsley and Hall (1967) study, which trained subjects on weight conservation, did find evidence of nonspecific transfer to a conceptually *simpler* task domain, substance conservation.

The relative effectiveness of various instructional strategies or enrichment procedures is a major experimental focus of many of the Piagetian training studies. A wide variety of training approaches is found in the present review and some of the experimental designs explicitly compared differing instructional techniques (Beilin, 1965; Gruen, 1965; Hooper, in press; Peters, 1970; Wallach, Wall, & Anderson, 1967; and Wohlwill & Lowe, 1962). Given the wide differences among instructional techniques, a major question concerns the relevancy of certain training attempts to the Piagetian stage construct assumptions. A failure to find significant learning could be attributed to either nonappropriate or ineffectual training strategies (type *and, or* amount of training) or to the resistance of stage-related behaviors to experimental manipulation. We have attempted to deal with this potential problem by placing primary emphasis upon those training studies which did demonstrate significant levels of *specific* posttraining transfer.

If we examine the distinctions present between the successful versus the nonsuccessful far-transfer cases, an interesting dichotomy emerges. All six of the studies (cited above) which failed to find nonspecific or far-transfer utilized a *single,* relatively unitary training procedure for any particular experimental treatment condition. In contrast, the six studies which showed significant far-transfer employed *multiple* training strategies for any treatment group. Thus, Bearison (1969) trained children on the comparison and numeration (counting) of discrete units within the liquid quantity conservation format, Gelman (1969) trained on number and length conservation, Kingsley and Hall (1967) trained on weight and length conservation, Rothenberg and Orost (1969) employed a wide variety of number conservation instructional techniques in combination, and Shantz and Sigel (1967), as well as Sigel, Roeper, and Hooper (1966) focused upon a number of related logical operations skills including multiple labeling, multiplicative classification and relationality concepts. As Beilin (1970) has made clear, although these multiple training approaches produce far-transfer, they fail to provide information as to the relative contributions of particular aspects or components of the overall training program. In brief, we don't know *what* it was that primarily influenced the subjects' new behavioral acquisitions.

Nonetheless, these multiple strategy studies appear to be notably effective insofar as nonspecific transfer is concerned. These results imply that training approaches that emphasize the provision of maximally structured, focused learning experiences (task specific) may not be the most effective means of facilitating cognitive growth. Wohlwill (1970b) has suggested a theoretical lattice model of experential input that distinguishes

between specific instruction that leads to vertical transfer and more general, nonspecific training that leads to more broadly based horizontal transfer. It is the latter, horizontal transfer, that appears to be involved in the present descriptions of within-stage derived far-transfer. A related interpretation of these results would involve learning sets or "learning to learn" (LTL) phenomena (Harlow, 1949, 1959). It appears that the provision of a variety of instructional settings or a series of experiences with differing task formats is ideally suited to the developmental capacities of the typical preoperational child. Most importantly, these variegated experiences lead to across-task generalization (a defining characteristic of LTL research) as represented by the present nonspecific far-transfer criterion. These learning set considerations are in general accord with a great deal of the research on concept or complex skills learning (see Goulet, 1971a, for a theoretical overview) and complement the suggestion of multiple, simultaneous training on more than one logical operations component as optimal for potential cognitive reorganization (Pinard & Laurendeau, 1969). The use of multiple training strategies in experimental formats probably offers a closer approximation to the generalized life experiences found in typical natural settings or as revealed in longitudinal ecological analysis (Wohlwill, 1966, 1970b). In discussing the relevance of the learning set research, Wohlwill (1970b) has stated:

> The work on the development of learning sets is of particular interest, since it may provide a clue to the questions of what it is that the older children possess that permits such broadly-based transfer, and how they came by it. One way of putting it is that they have acquired the ability to formulate rules for dealing with the stimulus input that operate for any particular set of stimuli, providing certain structural invariants are exemplified in them. This way of putting it brings the problem of the formation of learning sets rather close to the formation of concrete operations, notably the conservations. Indeed, though the two types of problems have yet to be investigated correlatively in the same children, the close link between them is suggested not only by the fact that discrimination-learning set formation appears to reach a peak toward the end of the concrete-operations period, but also by the demonstrated relationship to general intelligence, rather than chronological age (Harter, 1965). At the same time it seems clear that in the learning-set area, as much as in the concrete-operations area, the child's nonspecific experience plays a crucial role; in the case of learning-set formation, highly generalized experience appears to reduce the need for a large amount of specific experience, i.e., the number of different problems of a given type required before the set or rule is established is an inverse function of age. Admittedly the relevant components of the child's experience remain to be identified (p. 21-22).

Lest we become too optimistic, it should be recalled that *negative* transfer or interference effects are also potential outcomes of structured training programs (negative LTL is, also, at least a theoretical possibility). Certain negative effects of training were found in the Shantz and Sigel (1967) and Hooper (in press) research in which subjects trained on classification skills had relatively lower seriation task scores following instructional experiences. Beilin and Kagan (1969) reported similar results for the post-training scores for the noninstructed problem format of subjects given either pluralization rule or number concept training experiences. They concluded: ". . . This negative generalization effect from training on the alternative task may reflect the fragile nature of the abilities possessed by children at this age. A task with some conceptual similarity but placed in a different context can radically interfere with performance which at first shows considerable stability" (p. 703).

To conclude this resume of training research as it relates to Piaget's stages of cognitive growth, mention should be made of the serious methodological differences that are present in this problem area. Major differences exist as to what constitutes an adequate

conceptual and operational definition of logical operations functioning for many of these training studies. This is shown by the wide variety of task settings which have been employed as measures of nonspecific transfer of training and in the various descriptions of *valid* conservation performance (Flavell, 1970b; Gruen, 1966). As Beilin (1970) has pointed out:

> . . . There are two difficulties in determining whether true operativity is achieved. First, there is no agreement as to the nature of operativity. Non-Piagetians are not convinced of the need or efficacy of the concept of operativity preferring other conceptions. Behavioristically-oriented psychologists in particular reduce 'operations' to processes such as attention, set or various learning parameters more consistent with learning or behavior theories than cognitive theories. Those with cognitive orientations may prefer other functional or structural explanations. Since such theoretical differences lead to differences in the interpretation of data, there is no easy resolution of the conflict over whether operativity is attained, particularly if there is no agreement about the very existence of operativity (p. 44).

Certainly a definitive answer to the questions of optimal instructional approach, of optimal intervention interval (at what age range is training most beneficial?), and of the relationship of these considerations to the stage sequence and stage correspondence postulates depends upon the consensual adoption of uniform task and concept definitions.

GENERAL CONCLUSIONS

It is now appropriate to re-examine the two focal questions that structured the present review; i.e., to what degree does the secondary Piagetian literature substantiate (1) the assumption of invariant sequential relationships, and (2) the assumption of within-stage correspondence (convergence)? The first and most apparent point to be emphasized is that the studies included in the present review concern only one of the general Piagetian developmental periods, that of concrete operations. Thus, no attempt was made to evaluate the intuitively *obvious* invariant sequence (sensory-motor to concrete operations to formal operations) underlying the three general periods of cognitive development. Rather, the invariant sequential relationships at issue include two general cases. The first involves the prediction of a three stage sequence: (1) preparation phase with a notable absence of the criterial response; e.g., complete nonconservation; (2) transitional phase with notable response variability; e.g., intuitive, nonstable conservation; and (3) the stabilization or consolidation phase; e.g., completely uniform and generalized conservation of the content domain, attribute, or dimension in question. As studies of the concepts of quantity, number, space, classification, and seriation have shown, this three-phase pattern has generally been upheld.

The second type of sequential relationship concerns a number of conceptual task patterns in which one reponse category is viewed as both a logical and developmental prerequisite to the later acquisition of a conceptually higher order concept. Examples of this type of relationship would include: identity-equivalence conservation, distance conservation-spatial coordinates, conservation of weight-transitivity of weight, and the relationships among length, area, and volume measurements and conservation. The criterial issue in this case concerns exactly what is implied by the term "invariant." For example, while it is certainly true that the great majority of individual cases examined indicated that the theoretically less complex task was significantly easier or mastered earlier (cross-sectional data), there usually were a number of cases which did *not* conform to the predicted sequence. How are we to deal with these instances? Can

they justifiably be disregarded as cases of measurement error? Probably the most realistic conclusion is that most children acquire the relevant concepts or task abilities in the predicted order of acquisition but that a *universally* invariant sequence is not unequivocably substantiated. It follows that the response patterns and underlying cognitive functioning of the individuals who *deviate* from the general acquisition sequence merit considerable study and examination.

The case of within-stage correspondence (convergence) among theoretically interrelated response categories is much more clear cut. With few exceptions, within-stage correspondence has not been empirically substantiated. This follows directly from the fact that (1) we examined task performances specific to only one general stage or period—that of concrete operations, and (2) we found considerable evidence for quasi-invariant conceptual sequences within this general period. It must be concluded that across-task or across ability simultaneous developmental relationships are not the usual case for the period of concrete operations functioning. This lack of simultaneous development (correspondence) is evident in the research of Dodwell (1962), Lunzer (1960), MacKay, Fraser, and Ross (1970), Nassefat (1963), Shantz (1967), Smedslund (1964), and Siegelman and Block (1969).

The question remains—should these results surprise or, in any manner, discourage the observer of human cognitive development who elects to utilize the Piagetian-type stage construct? Based on the fundamental nature of the intermediate or transitional developmental phase, the answer to this, of course, should be "no." In contrast to the developmentally earlier preparation phase or the later appearing stabilization phase which demonstrate markedly low levels of interindividual and intraindividual response variability, the transitional interval (by definition) is marked by notably higher degrees of variability across subjects and across tasks for a particular subject. In consequence, developmental correspondence and sequential regularity are apt to be minimal during the transitional phase. As Wohlwill (1970a) has stated "The very notion of a transitional period, in which new behaviors or concepts are in process of emerging, is one which favors inconsistency rather than determinate patterning of behavior" (p. 184). It is this transitional phase which is the most interesting and important in terms of developing functional relationships. For example, it is the child in the transitional phase who is most susceptible to the influence of structured training or enrichment programs. However, paradoxically, it is this phase which presents the most serious problems of assessment and general methodology.

A model of cognitive development during the transitional phase has been proposed by Flavell and Wohlwill (1969). This model, based upon the psycholinguist's distinction between competence and performance (Chomsky, 1965), stated that the subject's observed performance depends upon both his underlying cognitive ability and the particular task setting. The probability of a *correct* response is considered to be a function of the interactions among the individual's past experience, the individual's current cognitive status, and the task demands of the assessment situation; e.g., the specific instructional set, and stimulus complexity present. Using this probability model, many of the potentially confounding methodological factors may be accounted for.

Issues of general conceptual definition and specific operational methodology pervade much of the Piagetian research literature. As mentioned earlier, there is a notable lack of consensual agreement on these matters. Beilin (1970) has pointed out:

> There is an additional difficulty in the measurement definition of operativity. Disagreements about the nature of operativity make it difficult to agree on the use of such measurement criteria as resistance to extinction, transfer, verbal representations of strategies, time delay and nonverbal performance criteria. It may be that a hierarchy of criteria is needed, as suggested by the Inhelder-Sinclair

(1969) work, in which levels of operativity can be conceived in relation to weak and strong criteria. The Genevans insist on strong criteria because the architecture of the theory seems to depend upon them. The use of other, at best, weaker criteria makes it easier to disconfirm Piagetian claims. Much needless controversy is undoubtedly created by differences as to what constitute acceptable standards of analysis (pp. 44-45).

It is clear from these statements that even if relatively standardized task formats result in *reliable* measures, the fundamental question of test *validity* remains. How closely do these measurement situations parallel the normative performance of children in *real life* situations? The same comment may be directed towards the uncritical application of results from quasi-laboratory training-enrichment studies to explanations of the development of cognitive functioning in children who typically grow up in natural, unstructured settings.

In retrospect, it is apparent that in designing an empirical, normative analysis of cognitive development, the dual assumption of stage correspondence is, perhaps, too absolute and simplistic. Theoretical discussions of the stage construct in Piagetian theory (Beilin, in press; Inhelder, 1956; Kessen, 1962; Piaget, 1956; Reese and Overton, 1970) have emphasized the basic complexity and unresolved issues inherent in the use of a stage-oriented approach. More importantly, the basic research problems and appropriate methodologies germane to a stage analysis of cognitive development have been the focus of a number of recent papers (Flavell, 1970a, 1970b, in press; Flavell & Wohlwill, 1969; Piaget, 1970; Pinard & Laurendeau, 1969). In this regard, Flavell's (in press) analysis of alternatives to the present stage sequence and correspondence assumption is particularly noteworthy. Flavell points out that the child's task performances that represent Stage X behavior develop *gradually* rather than *abruptly*. Typically, task specific behavior reaches *functional maturity* during a stage following the one in which it first develops.

> The fact that the acquisition period of a stage-specific item appears to constitute an extended temporal interval rather than a temporal point renders ambiguous the notion of developmental synchrony or concurrence. . . . Two conclusions were drawn with respect to interitem concurrence, after having restricted the term to mean only the synchronous emergence (i.e., synchronous *initial* development) of two or more items. First, items from the same stage may often emerge in an invariant or near-invariant sequence rather than concurrently, although important methodological problems cloud the research evidence on this point. Second, a stage theory such as Piaget's does not in any event logically require or predict anything but a very loose sort of item concurrence at most, and research attempts at establishing strict concurrences have been accordingly misguided in rationale (pp. 51-52).

In view of these generalizations, we may well ask what directions should guide our subsequent research endeavors. If it is recognized that our ultimate goal is a comprehensive understanding (with the implications of accurate prediction and associated control) of the functional relationships underlying normative cognitive development, then certain implications are evident. At present, we know very little about the major factors and variables which, in the routine life experiences of human organisms, determine the course of cognitive growth. An understanding of these factors clearly requires an ecological analysis concerning the spontaneous activities of children in natural situations. Ideally, these ecological analyses should be conducted within longitudinal assessment designs with appropriate sampling and measurement control features. It may be noted that of the great number of studies included in the present review, only four utilized longitudinal measurement designs. Acknowledging the well known procedural and economic difficulties associated with longitudinal assessment designs, the relatively brief duration of the notable cognitive changes associated with middle childhood makes this lack

of relevant information even more obvious. Any longitudinal assessment of intellectual functioning should also include explicit consideration of the many *non*cognitive aspects of human development such as personality factors, socialization influences, and peer group interactions. The literature on cognitive development, as reflected in the present review (with the exception of the Peters, 1970; and Saltz and Hamilton, 1968 studies) has, unfortunately, ignored the affective dimensions of intellectual development and has thus revealed a distinctly sterile and unrealistic overall picture. Children do not demonstrate cognitive growth in an affective vacuum!

Finally, further research effort should feature integrated intervention designs which, through specific experimental manipulation, present materials in functionally appropriate sequences. The use of enrichment programs, such as the transfer of training designs outlined in this review could provide a basic source of information concerning the *causative* developmental relationships essential to an understanding of human growth across the life span (Hooper, 1971; Wohlwill, 1970a). This combination of controlled intervention programs and comprehensive longitudinal assessment designs includes the advantages of descriptive developmental psychology and experimental behavioral analysis (Baltes & Nesselroade, 1971).

It may be seen that we have drawn a picture of human cognitive development much more complicated than our initial dual questions would have implied. This is not in itself unique for Piagetian theory as ". . . any monolithic attempt to describe or encompass the totality of cognitive growth from birth to maturity is certain to encounter conceptual problems. To believe otherwise is to ignore the immense complexity and inherent spontaneity of man as an intellectual organism or to greatly overestimate our current level of sophistication in the behavioral sciences" (Sigel & Hooper, 1968, p. 5). Regardless of our personal theoretical biases we may concur with Flavell's (in press) concluding statements:

> The claim that stage-specific items develop very gradually and asynchronously, they might say, amounts to no less than a tacit denial of the very concept of stage, and also perhaps, an implicit rejection of the fundamental tenets of Piaget's theory. I personally find it profitless to think in the terms ("denial," "rejection") of such arguments. Our task is, after all, not to contend with this concept and that theorist, but to seek a clearer picture of developmental reality, to try to understand how development actually proceeds. If the clearer picture should reveal "stage" to be a less simple and straightforward notion than we used to think it was, or if the picture should fail to square with something Piaget has said, so be it—it simply means that developmental psychology is showing the normal developmental course of any science (Flavell, in press, pp. 52-53).

FOOTNOTES

1. Correspondence within stages is directly related to the concept of *structure* in Piagetian theory. Structuring, in the present context, "concerns the actual organization of the intellectual behaviors characteristic of a particular level of functioning. According to this criterion, the typical actions or operations of a given level are not simply juxtaposed one with another in an additive fashion, but are organically interconnected by ties of implication and reciprocal dependence that unite and group them into total structures—Piaget's *structures de" ensemble* (Pinard & Laurendeau, 1969, p. 136). The prediction of within-stage correspondence or convergence, and its singular relationship to the assumption of logical operations has recently been stated:

   > . . . If, in the first place, any given operation has the profundity and generality

> which Piaget's theory ascribes to it, then its acquisition should be manifested by the child's sudden ability to solve any and all cognitive tasks to which it is applicable. In other words, the picture ought to be one of pronounced developmental concurrence across this ensemble of tasks—either consistent success or consistent failure, depending upon whether the child has or has not yet acquired the underlying operation. If, in the second place, these highly general operations are also bound together into structures (with these structures in turn tightly interlinked), then one would likewise expect developmental synchronisms across operations). As soon as a child can master any task requiring one operation, therefore, he should be able to master any other task requiring any other operation, whether it belongs to the same grouping or not. To the extent that developmental reality fails to accord with this ideal picture, that is, it presents numerous asynchronisms within and between operations) to that extent would such key Piagetian expressions as "stage," "operation," and "structure" become imprecise and even misleading. (Flavell, 1970b, pp. 1037-1038).

3. Many of the training endeavors are critical of Piagetian theory for its alleged failure to consider experential factors as important determinants of cognitive growth; e.g., "Piaget maintains that specific training plays little or no role in the acquisition of the concept of conservation" (Mermelstein & Meyer, 1969, p. 471). This view is clearly *not* in accord with the statements of Piaget concerning the interdependent roles of maturation and learning (Piaget, 1964; Piaget & Inhelder, 1969). It should be recognized that the great majority of attempts to *accelerate* Piagetian concept acquisition, although claiming to test the stage aspects, in reality convey very little information relevant to the present stage construct assumptions. In order to empirically refute the stage sequence assumption, for example, the following would have to be demonstrated. Subjects initially located at stage A (in the stage sequence A—B—C) would have to evidence stage C competencies following training *without* concomitant mastery of the stage B task requirements. The assessment design provisions of most training studies fail to permit these evaluations.
4. Ideally, groups of nonpretested treatment and control subjects should also be included, thus permitting the evaluation of pretesting and pretest/treatment interaction effects, Campbell and Stanley, 1963.

2. A number of cross-sectional studies have applied analytic scaling techniques and related correlational approaches to areas of Piagetian concept acquisition. These include studies of quantity concepts (Davol, Chittenden, Plante, & Tuzik, 1967; McRoy, 1967; Papalia & Hooper, 1971; Schwartz & Scholnick, 1970; Uzgiris, 1966), number concepts (Dodwell, 1961; Mannix, 1960; Wohlwill, 1960), spatial concepts (Laurendeau and Pinard, 1970), classification skills (Kofsky, 1966), causal reasoning (Laurendeau & Pinard, 1962), as well as a series of concrete and formal operations task settings (Goldschmid & Bentler, 1968; Nassefat, 1963; Siegelman & Block, 1969). While the majority of these applications have been directed towards task *sequence* problems, scaling analyses may also provide information regarding the dimensional nature of tasks specific to one general period (e.g., concrete operations) as compared to another stage or period (e.g., formal operations), cf. Nassefat (1963). The logical and statistical problems implicit in the utilization of scaling strategies for developmental investigations are discussed by Wohlwill (1970a). Conventional R-R correlational techniques have been applied to Piagetian task arrays by Braine (1959), Dodwell (1962), and Shantz (1967). Factor analytic approaches have been used by Berzonsky (1971) and Vernon (1965).

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LONG-TERM RESEARCH

Note: The reports in this section concern research programs that are continuous.

28-AA-1 LONGITUDINAL STUDY OF CHILD GROWTH AND DEVELOPMENT

Investigator(s): Lester W. Sontag, M.D., Director, Fels Research Institute for the Study of Human Development, Antioch College, 800 Livermore Street, Yellow Springs, Ohio 45387.

Purpose: To study adult personality, adjustment, and aging processes of subjects whose health, growth, personality development, and environment have been studied since birth.

Methods: The program included a study of the aging processes of the subjects' parents in relation to physical and biochemical measures made earlier. It will include studies of parental childrearing practices in the same families for two generations, constancy of autonomic response patterns to stress from childhood to young adulthood, and the relationship of response patterns to psychosomatic disorders in adulthood. Blood lipids in relation to body composition and change in composition will also be studied.

Cooperating group(s): Public Health Service, U. S. Department of Health, Education, and Welfare.

28-AA-2 LONGITUDINAL CROSS-CULTURAL STUDY OF HUMAN DEVELOPMENT

Investigator(s): Harben Boutourline Young, M.D., Research Associate, Human Growth and Development, School of Public Health, Harvard University, Boston, Massachusetts 02115. (Address correspondence to: Harben Boutourline Young, M.D., Harvard Florence Research Project, Via Venezia 10, Florence, Italy.)

Purpose: To observe the long-term effects of environment on growth and health; i.e., the influence of environmental factors upon physical and mental development, and their mode of action and interaction with genetic endowment.

Subjects: Several hundred males, studied from prepuberty, each with four grandparents from the same geographical zone of southern Italy, who now live in the markedly different cultures of Boston, Rome, and Palermo; other groups of 100 girls and several hundred boys in Florence, Italy; and 200 girls in Boston.

Methods: Repeated medical, anthropometric, and psychological examinations have been conducted, family interviews held (to evaluate childrearing practices), and nutritional and sociocultural data have been collected. Current work under analysis includes a cross-cultural study of moral values; studies of biological age and its estimation; estimation of socioeconomic status across cultures; and a study of changing hemoglobin values in adolescent males. Work that involves further and continuing data collection includes prediction of growth variables; a cross-cultural study of creativity and its environmental determinants; a study of left-handed subjects in the relatively permissive and intolerant cultures of the United States and Italy; and an analysis of menstrual symptoms in both cultures.

Duration: 1956-continuing.
Cooperating group(s): Grant Foundation; Wenner Gren Foundation; Olivetti Corporation; Universities of Florence, Rome, and Palermo.
Publications: *Perceptual and Motor Skills,* 1966, 23, 35-40; *Bulletin of the International Epidemiological Association,* 1965, 12, 1936; *American Journal of Diseases of Children,* 1963, 106, 568-577.

28-AA-3 CHILD HEALTH AND DEVELOPMENT STUDIES

Investigator(s): Jacob Yerushalmy, Ph.D., Professor of Biostatistics, School of Public Health, University of California at Berkeley, Berkeley, California 94720; Stephen Thomas, M.D., Director, Department of Obstetrics and Gynecology; and Edgar Schoen, M.D., Director, Department of Pediatrics, Kaiser Foundation Hospital, Oakland, California 94611.
Purpose: To investigate the relationship of parents' biologic, genetic, and environmental influences (including events during pregnancy, labor, and delivery) to the normal and abnormal development of offspring.
Subjects: Members of the Kaiser Foundation Health Plan (a prepaid medical care program) who reside in the San Francisco-East Bay area.
Methods: Expected byproducts of the investigation are the relationships of factors studied to (1) wasted pregnancies in the forms of early fetal death, perinatal mortality, infant and child mortality; and (2) estimates of the incidence of different types of abnormalities. The study is a prospective, longitudinal type involving both mother and child. Gravidas in the Department of Obstetrics and children in the Pediatric Department are observed, interviewed, and given laboratory examinations. Physicians' observations are systematized uniformly. Special efforts are made to obtain information on members of the study who do not return to the plan for medical care. Detailed growth curves for children, ages birth to 6, and estimates of illnesses and injuries in infancy and the preschool child will be derived on a longitudinal basis.
Duration: July 1959-indefinite.
Cooperating group(s): Permanente Medical Group; Kaiser Foundation Research Institute.
Publications: *Journal of Pediatrics,* August 1967, 71(2), 164-172; *Pediatrics,* 1967, 39, 940-941; *American Journal of Obstetrics and Gynecology,* February 15, 1964, 88(4), 505-518.

28-AA-4 THE BERKELEY, CALIFORNIA GROWTH STUDY

Investigator(s): Dorothy H. Eichorn, Ph.D., Research Psychologist, Institute of Human Development, University of California at Berkeley, Berkeley, California 94720.
Purpose: To study the mental and physical growth of normally healthy persons from birth to the present.
Subjects: 60 full-term, healthy newborns, born in Berkeley hospitals in 1928 to 1929 of white, English-speaking parents; and 140 offspring of these subjects, ages birth to 20, seen irregularly.
Methods: The same data, appropriate for age, were collected for the subjects and their offspring. Beginning in the first week of life, tests of mental and motor development, pediatric examinations, and interviews were conducted at frequent intervals during growth. At all visits, inquiries were made concerning current health and recent

illnesses. Anthropometrics, body photographs, and skeletal X-rays were taken at most ages. Socioeconomic data were collected. Studies of the physical aspects of growth include analyses that compare health histories with physical growth and with skeletal maturation. Emotional and other personality variables are being studied for consistency, and in various interrelations with maternal behavior in infancy, birth histories, socioeconomic status, and intellectual and physical growth.

Duration: 1928-continuing.

Publications: *American Psychologist,* 1968, 23(1), 1-17; *Monograph of the Society for Research in Child Development,* 1963, 28; Bayer, Leona and Bayley, Nancy. *Growth diagnosis: Selected methods for interpreting and predicting physical development from one year to maturity.* Chicago: University of Chicago Press, 1959.

28-AA-5 GROWTH OF PSYCHOPHYSIOLOGICAL PATTERNS IN INFANCY

Investigator(s): Wagner H. Bridger, M.D., Associate Professor of Psychiatry; and Beverly Birns, Ph.D., Assistant Professor of Psychology, Albert Einstein College of Medicine, Yeshiva University, Bronx, New York 10461.

Purpose: To investigate the origins and course of development of individual differences in neonates.

Subjects: Normal, healthy, full-term babies, 2 to 5 days old, born at Bronx Municipal Hospital Center.

Methods: A neonatal behavioral profile, which was established in previous studies, will be used. The profile includes behavioral and heart rate ratings on excitation, soothing, feeding, sleep, and nonstimulus periods of observation. Neonates will be followed at ages 2 weeks, and 1, 2, 3, and 4 months to measure the stability of early appearing traits and their relation to later behaviors. Data will be analyzed with respect to stability of early appearing behaviors and the relationship between neonatal behavior and maternal and birth history.

Duration: 1966-continuing.

Cooperating group(s): National Institute of Mental Health, Public Health Service, U. S. Department of Health, Education, and Welfare.

Publications: In Grant Newton and Seymour Levine (Eds.), *Early experience and behavior: Psychobiology of development.* Springfield, Illinois: Charles C. Thomas, 1968; *Psychosomatic Medicine,* 1966, 28, 316.

28-AA-6 LONGITUDINAL STUDY OF DENTOFACIAL, SKELETAL, PHYSICAL GROWTH, AND NUTRITION OF CHILDREN

Investigator(s): Bhim S. Savara, D.M.D., M.S., Chairman, Child Study Clinic, University of Oregon Dental School, Portland, Oregon 97201.

Purpose: To study the dentofacial growth of children, standards of nutrition, caries increment related to nutrition, assessment and skeletal age related to facial growth, and variations in physique and its effect on dentofacial growth; and to determine heritable traits.

Subjects: 400 children, including 40 pairs of twins, ages 3 to 18, observed for periods of 3 to 10 years.

Methods: Cephalograms, hand, wrist, and calf X-rays, intraoral X-rays, study casts,

anthropometric measurements, and photographs are taken; and oral examinations are administered to the subjects. A 1-week food diary is recorded. Children are examined every 6 months until age 14.
Duration: 1950-continuing.
Cooperating group(s): Oregon State Board of Dental Examiners; National Dairy Council; Tektronix Foundation, Inc.; Medical Research Foundation of Oregon; National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: *Growth,* 1967, 31(2), 119-131; *Human Biology,* 1967, 39(2), 182-191; *Archives of Oral Biology,* 1967, 12(4), 469-486.

28-AA-7 RADIOGRAPHIC STANDARDS OF REFERENCE FOR SKELETAL DEVELOPMENT OF CHILDREN: REVISIONS AND NEW STANDARDS

Investigator(s): S. Idell Pyle, Ph.D., Research Associate in Anatomy, School of Medicine, Case Western Reserve University, Cleveland, Ohio 44106; William W. Greulich, Ph.D., Research Biologist, National Institute of Child Health and Human Development, Bethesda, Maryland 20014; and staff of the National Center for Health Statistics involved in the National Health Survey, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington, D.C. 20201.
Purpose: To develop radiographic standards of reference for skeletal development of children.
Subjects: Healthy children in Cleveland.
Methods: Between 1937 and 1962 series of films of approximately 1,000 healthy Cleveland children were used to prepare standards for the hand and wrist, the knee, and the foot and ankle. These standards display a modal rate of development of each bone in these three regions of the growing skeleton as they appear at regular intervals between birth and adulthood.
Cooperating group(s): Bolton Study, Cleveland, Ohio; Department of Maternal and Child Health, Harvard University School of Public Health.
Publications: Pyle, S. Idell and Hoerr, N.L. *A radiographic standard of reference for the growing knee.* Springfield, Illinois: Charles C. Thomas, 1969.

28-AA-8 METHODS IN CHARACTER DEVELOPMENT

Investigator(s): Ernest M. Ligon, Ph.D., Director; and staff, Union College Character Research Project, 10 Nott Terrace, Schenectady, New York 12308.
Purpose: To develop more effective methods in character development in cooperation with families and character-training agencies. (Character is defined in terms of three dimensions: philosophy of values, breadth of social vision, and strength of purpose.)
Subjects: Children and families throughout the United States. The families belong to churches, YMCA's, and schools but participate in the study as individual families.
Methods: Procedures of the research are based on action research, in which the participants cooperate with the laboratory and use methods of coscientist research. Open-ended reports on research goals constitute the basic body of research data. An analysis of these data serves as the basis for the development of new procedures and for the scientific reports that are published concerning it.
Findings: Reports have been prepared concerning hypotheses tested in the home

and character-building agencies. Most of the findings relate to the home, learning, decision making, and methods for character development, plus descriptions of age-level potentials, especially for decision making.
Duration: 1935-continuing.
Cooperating group(s): Lilly Endowment, Inc.
Publications: Detweiler, Herbert. *How to stand up for what you believe.* New York: Association Press, 1966; Ligon, Ernest M. and Smith, Leona J. *The marriage climate.* St. Louis, Missouri: Bethany Press, 1963; *Character Potential: A Record of Research,* July 1970, 5(1 and 2).

28-AA-9 LONGITUDINAL STUDIES OF CHILDREN WITH CRANIOFACIAL BIRTH DEFECTS

Investigator(s): Samuel Pruzansky, D.D.S., Director, Center for Craniofacial Anomalies, University of Illinois Medical Center, Chicago, Illinois 60612.
Purpose: To study the epidemiology, genetics, morphology, physiology, and postnatal development of congenitally deformed craniofacial structures.
Subjects: 2,000 subjects.
Methods: Most subjects were initially studied as infants. Procedures included roentgenocephalometry and tomography. Dental casts, photographs, and speech, hearing, psychosocial, and pediatric evaluations supplied additional information.
Duration: 1949-continuing.
Cooperating group(s): Illinois State Pediatric Institute; National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: A list of articles in journals of dentistry, medicine, public health, speech and hearing, and psychology is available from the investigator.

28-AA-10 YOUTH REPORTS

Investigator(s): Cecelia E. Sudia, M.A., Director, Youth and Child Studies Branch, Children's Bureau, Office of Child Development, U. S. Department of Health, Education, and Welfare, P. O. Box 1182, Washington, D. C. 20013.
Purpose: To collect and analyze opinions and values of high school age youth.
Subjects: 250 high school students.
Methods: Students were randomly chosen from youth enrolled in college preparatory courses in high schools selected to cover urban and suburban schools in each of 12 metropolitan areas in the United States. Each student was sent a set of short, open-ended questions and asked to report on the range of opinions in his school or neighborhood group. It is anticipated that the panel will be interviewed in this way three or four times a year. Replies are coded for content; analysis is both quantitative and qualitative.
Findings: The method of mail interview is successful with this group of students.
Duration: Spring 1969-continuing.
Publications: Teenagers discuss the "generation gap." *Youth Reports No. 1,* U. S. Department of Health, Education, and Welfare, 1969; Youth reporters discuss "problem drugs." *Youth Reports No. 2,* U. S. Department of Health, Education, and Welfare.

28-AA-11 PHILADELPHIA CENTER FOR RESEARCH IN CHILD GROWTH

Investigator(s): Wilton M. Krogman, Ph.D., LL.D., Director, Philadelphia Center for Research in Child Growth; Geoffrey F. Walker, B.D.S., Director, Philadelphia Center for Craniofacial Biology, University of Pennsylvania, Philadelphia, Pennsylvania 19146; and Francis E. Johnston, Ph.D., Department of Anthropology, University of Texas, Austin, Texas 78712.

Purpose: To develop standards and norms of physical growth and development for normal, healthy children in Philadelphia.

Subjects: 300 white boys and 300 white girls; 250 black boys and 250 black girls; ages 6 to 17.

Methods: Cephalometry and somatometry are employed. Measurements are linear, transverse, sagittal, circumferential, skin thickness (via skin calipers), X-ray films of left hand (routinely) and of upper arm or lower leg (reduced number of cases); also of head and face in *norma laterales sinistra* and *norma faciales* (roentgenographic cephalometry). Dental models are taken. Histories secured are (1) familial in terms of ethnic background and socioeconomic status; (2) medical (illness) and dental (occlusion, dental stage, oral habits); and (3) genetic, in terms of the familial occurrence of trait(s) considered. All data may be referred to several age categories: (1) chronological age, (2) dental or eruptive age, and (3) skeletal or biological age. All data have been put on microfilm, coded, and stored in computer memory. (1) *School Series:* initially based on 600 normal, healthy, white 6- to 12-year-old school children from five Philadelphia schools (ultimately followed to 22 schools). These children have provided the core data upon which the 7- to 17-year standards are based. (2) *Negro American Series:* based on the semiannaul study of 500 elementary school children. These children have provided the core data upon which the 7- to 17-year standards are based. (3) *Orthodontic Series:* now numbers 2,700 children from the Orthodontic Clinics of the University of Pennsylvania (2,000) and the Children's Hospital (500). All of these children have been followed through their treatment course (2 to 4 years, average). There are posttreatment follow-up studies on about 10 percent of them. (4) *Cleft Palate Series:* in cooperation with the Children's Hospital. These data are single preoperative roentgenographic cephalometric, plus selected somatometry. There are 600 such records and follow-up data on about 10 percent of these children. (5) *Cooley's Anemia Series:* based on 120 children. Measurements, X-ray films, familiogenetic histories were taken, and therapeutic treatment was given. (6) *Endocrine and Chromosomal Series:* Children seen on a referral basis from Children's Hospital.

Duration: 1949-1971.

Cooperating group(s): Children's Hospital of Philadelphia; Philadelphia Board of Education; School System, Archdiocese of Philadelphia; National Institute of Dental Research and National Institute of Child Health and Human Development, Public Health Service, U. S. Department of Health, Education, and Welfare.

Publications: *Monograph of the Society for Research in Child Development,* May 1970, 35(3, Serial No. 136).

28-AA-12 LONGITUDINAL GROWTH STUDY OF GUATEMALAN CHILDREN OF DIFFERENT RACIAL HISTORIES AND SOCIOECONOMIC BACKGROUNDS

Investigator(s): Francis E. Johnston, Ph.D., Associate Professor, Department of Anthropology; Robert M. Malina, Ph.D., Assistant Professor; and Martha Galbraith, Ph.D., Faculty Associate, University of Texas, Austin, Texas 78712; and Robert

MacVean, Ed.D., Vice-Rector of Universidad del Valle de Guatemala, and Director of American School, Guatemala City, Guatemala.

Purpose: To study the interrelationships between growth measurements and performance measurements in a longitudinal sample of Guatemalan children of different genetic and socioeconomic backgrounds.

Subjects: Approximately 2,000 male and female students, ages 6 to 16, enrolled in two public and two private schools in Guatemala City are examined each year. Children are of Guatemalan, European, and North American backgrounds.

Methods: Subjects are examined each spring. Data gathered include anthropometric measurements, hand-wrist X-rays, results of intelligence and performance tests, and medical examination records. Cross-sectional and longitudinal analyses of data will be performed.

Duration: 1953-1975.

Cooperating group(s): American School, Guatemala City; Universidad del Valle de Guatemala; University of Texas, Austin.

28-AA-13 PROGNOSTIC VALUE OF NEONATAL BEHAVIORAL ASSESSMENTS

Investigator(s): Judy F. Rosenblith, Ph.D., Professor of Psychology, Wheaton College, Norton, Massachusetts 02766, and Associate Member, Institute of Life Sciences, Brown University, Box 1910, Providence, Rhode Island 02912.

Purpose: To determine if standardized behavioral assessment of newborns can be used to identify a population at risk to later neurologically based developmental dysfunction.

Subjects: Approximately 1,750 newborns, 1,550 of whom participate in the Providence Collaborative Perinatal Research Project.

Methods: The Rosenblith modification of the Graham Scale, a behavioral assessment, was used to determine the neurological, muscular, and sensory status of the newborns. Prognostic value of this scale is determined by relating it to criteria obtained in the follow-up assessments of the Collaborative Perinatal Research Project. Replication of the original study was done with 400 infants. Data are now complete through the fourth year psychological examination.

Findings: Newborn measures are related to development at 8 months of age. Specific newborn signs are prognostic of later dysfunction: hypersensitivity to light is indicative of severe neurological damage; unusual patterns of muscle tonicity are related to varying degrees of developmental problems. The newborn assessments could be routinely adapted by hospitals: the equipment costs less than $10; the time required for assessment is less than a ½ hour; and the examination procedure can be taught to paraprofessional personnel.

Duration: January 1958-September 1975.

Cooperating group(s): Providence Lying-In Hospital; Child Development Study and Institute of Life Sciences, Brown University.

Publications: *Biologia Neonatorium*, 1970, 15, 217-228; *American Academy of Ophthalmology and Otolaryngology. Transactions* (in press).

28-AA-14 COLLABORATIVE STUDIES IN CEREBRAL PALSY AND OTHER NEUROLOGICAL AND SENSORY DISORDERS OF INFANCY AND CHILDHOOD

Investigator(s): Heinz W. Berendes, M.D., National Institute of Neurological Diseases

and Stroke, Public Health Service, U. S. Department of Health, Education, and Welfare, Bethesda, Maryland 20014.

Purpose: To investigate factors and conditions that affect parents: (1) conditions of pregnancy; e.g., infections, trauma, bleeding, drugs, and progress of labor; (2) environmental factors that influence the mother; e.g., social and economic conditions, emotional stress, and medical care; (3) biological factors in parents; e.g., age, parity, medical and reproductive history, and immunologic characteristics; and (4) the genetic background of the parents. To investigate in the offspring: disorders of the nervous system at the time of delivery or disorders that appear during infancy or early childhood, including cerebral palsy, mental subnormality, and behavioral disorders.

Subjects: Approximately 8,000 live births a year from collaborating institutions for 5 years. Offspring are followed until school age.

Methods: A detailed investigation of the independent variables will be directed towards the reevaluation of the effect of factors already suspected, clarification of the way in which these factors are operative, and the discovery of new factors. Information, from women studied during pregnancy and from their offspring throughout infancy and early childhood, will be collected in a uniform way in a number of medical centers throughout the country. The data will be analyzed. Intensive study is made of a limited number of cases; less intensive studies are conducted for as many damaged children and abnormal pregnancies as possible.

Duration: 1956-continuing.

Cooperating group(s): Yale University, New Haven, Connecticut; Charity Hospital, New Orleans, Louisiana; Johns Hopkins University, School of Medicine, Baltimore, Maryland; Boston Lying-In Hospital, Children's Medical Center, and Harvard University (Warren Anatomical Museum), Boston, Massachusetts; University of Minnesota Medical School, Minneapolis, Minnesota; Columbia-Presbyterian Medical Center and New York Medical College, New York, New York; Children's Hospital of Buffalo, Buffalo, New York; University of Oregon Medical School, Portland, Oregon; Children's Hospital of Philadelphia and Pennsylvania Hospital, Philadelphia, Pennsylvania; Brown University, Providence, Rhode Island; University of Tennessee Medical School, Memphis, Tennessee; Medical College of Virginia, Richmond, Virginia.

Publications: Chipman, S. S.; Lilienfeld, A. M.; and Donnelly, J. F. (Eds.) *Research methodology and needs in perinatal studies.* Springfield, Illinois: Charles C. Thomas, 1966. Chapters 5 and 6. A bibliography is available from the investigator.

28-AA-15 STUDY OF INFANT TWIN PERSONALITY DEVELOPMENT

Investigator(s): William Pollin, M.D., Chief; James Stabernau, M.D.; Martin G. Allen, M.D.; and Axel Hoffer, M.D., Clinical Associates, Section on Twin and Sibling Studies, Adult Psychiatry Branch, National Institute of Mental Health, Public Health Service, U. S. Department of Health, Education, and Welfare, Bethesda, Maryland 20014.

Purpose: To investigate the normal personality development of identical twins and the interaction between environmental and constitutional factors; specifically, to define and find explanations for personality differences in identical twins.

Subjects: Infant monozygotic twins in an intact family.

Methods: When a diagnosis of multiple pregnancy is made, parents and obstetrician are requested for permission to contact the family for the study. One or two prenatal interviews are held with the parents, and a researcher is present at the delivery to observe the delivery process and the earliest postnatal period for each twin. Zygosity

is determined by studies on the placenta and cord blood. Twins are observed in the pediatric nursery and are given a neurological examination, which is repeated at age 1. Home visits to observe the twins are made several times a year. Parents are questioned about the twins' growth and development and their reactions to the twins. Particular attention is paid to interacting physiological and psychological features that tend towards further differentiation and those features that favor the maintenance of similarity between identical twins. The way in which nongenetic constitutional factors influence the family environment as experienced by each twin is noted.

Duration: 1967-1980.

28-AA-16 PREVENTIVELY ORIENTED SCHOOL MENTAL HEALTH PROGRAMS

Investigator(s): Emory L. Cowen, Ph.D., Professor, Department of Psychology, and Director; D. A. Door, Ph.D., Research Coordinator; L. D. Izzo, M.A., Chief Psychologist; and M. A. Trost, M.A., Chief Social Worker, Primary Mental Health Project, University of Rochester, River Campus Station, Rochester, New York 14627.

Purpose: To detect and prevent school maladaptation.

Subjects: 7,500 school children including 4,500 primary children in 11 preventively oriented school mental health programs.

Methods: Current research which originated in 1958 (see *Research Relating to Children*, Study 19-SS-7), includes 23 studies on training nonprofessionals; evaluation of programs, process analyses, selection-process relations, selection-outcome relations, and process-outcome relations. Between 20 and 30 different research instruments and assessment procedures are being used.

Duration: February 1969-continuing.

Cooperating group(s): University of Rochester.

GROWTH AND DEVELOPMENT

General

28-BA-1 SOCIOLOGICAL STUDY OF THE DEVELOPMENTAL SEQUELAE OF PREGNANCY AND LABOR

Investigator(s): Raymond Illsley, Ph.D., Professor of Sociology, and Director, Medical Research Council, Medical Sociology Unit, Centre for Social Studies; and Dugald Baird, M.D., F.R.C.O.G., Emeritus Professor of Obstetrics and Gynecology, University of Aberdeen, Westburn Road, Aberdeen, AB9 2ZE, Scotland.
Purpose: To explore the social processes that link obstetric events with presumed developmental consequences in children.
Subjects: 11,800 children who were born and still reside in Aberdeen, Scotland; and their siblings.
Methods: Birth data, collected and recorded specifically for research purposes, are linked to subsequent performance of children from their seventh until their eleventh year. Physical and mental development and illness data are collected either from routine sources or by special testing. Some comparable data are available on siblings.
Duration: 1962-1973.
Cooperating group(s): University of Aberdeen; Medical Research Council; Association for the Aid of Crippled Children, New York.
Publications: *Procedures of the Royal Society of Medicine,* 1966, 59(3); Illsley, R. Family growth and its effect on the relationship between obstetric factors and child functioning. In Platt and Parkes (Eds.), *Social and genetic influences on life and death,* 1967; Illsley, R. The sociological study of reproduction and its outcome in S. A. Richardson and A. F. Guttmacher (Eds.), *Childbearing—Its social and psychological aspects.* Williams and Wilkins Co., 1967.

28-BA-2 THE CHILD DEVELOPMENT INVENTORY

Investigator(s): Harold R. Ireton, Ph.D., Assistant Professor, Health Services Center, University of Minnesota, Box 393, Minneapolis, Minnesota 55455; and Edward J. Thwing, Ph.D., Tri-County Mental Health Center, Baldwin, Wisconsin 54002.
Purpose: To provide a psychometric instrument for the developmental assessment of young children.
Subjects: 400 white boys and 400 white girls, ages 6 months to 6½ years.
Methods: The Child Development Inventory consists of 366 statements that describe the behaviors of children in the first 6 to 7 years of life. The statements are selected for (1) representation of developmental skills, (2) observability by mothers, and (3) empirical age discriminability. The inventory is completed by the child's mother, who endorses those statements that describe the child's behavior. Separate norms are established for each sex by age. Results are represented in terms of 10 scales: (1) Gross Motor, (2) Fine Motor, (3) Expressive Communication, (4) Verbal-Conceptual Compre-

hension, (5) Situational Comprehension, (6) Self-Care, (7) Personal-Social, (8) Visual Screen, (9) Auditory Screen, and (10) Developmental Maturity Index. The results are presented in profile with guidelines for interpretation.
Duration: 1966-1971.

28-BA-3 LOW BIRTH WEIGHT STUDY

Investigator(s): John I. Cater, MB.CH.B., MRCPE; and Lesley M. H. Johnstone, M.A., Centre for Social Studies, Department of Sociology, University of Aberdeen, Westburn Road, Aberdeen, AB9 2ZE, Scotland.
Purpose: To delineate the obstetric, medical, and sociological factors related to the ultimate functioning of a cohort of low birth weight infants.
Subjects: All surviving, legitimate, singleton, low birth weight infants (2,500 grams or less) and their matched controls, delivered of mothers who resided in Aberdeen, Scotland from July 1969 to July 1970.
Methods: The control babies were selected by matching the criteria of (1) ordinal position in the family, (2) infant sex, (3) social class (based on fathers' occupations), (4) maternal height, and (5) maternal smoking patterns. The study will examine both medical and sociological factors through detailed clinical examinations and close scrutiny of social environments by visits to the infants' homes.
Duration: October 1968-October 1971.

Physical

28-CA-1 STUDY OF MICRO TESTS FOR CHILDHOOD LEAD POISONING

Investigator(s): J. J. Chisolm, Jr., M.D., Associate Professor of Pediatrics, School of Medicine, Johns Hopkins University, Baltimore, Maryland 21205; and Associate Chief of Pediatrics, Baltimore City Hospitals, 4940 Eastern Avenue, Baltimore, Maryland 21224.
Purpose: To develop practical and reliable micro tests to screen children for the prevention of lead poisoning.
Subjects: All children, ages 1 to 5, who attend the Johns Hopkins Hospital Comprehensive Child and Youth Clinic for regular medical care. Approximately 4,500 children are eligible.
Methods: Evaluations of body lead burden will be made in normal children and children with subclinical increases in body lead burden through the measurement of the response to the edathamil calcium disodium (CaEDTA) mobilization test, endogenous 24-hour urinary delta aminolevulinic acid (ALA) excretion.
Findings: Methods suitable for the determination of lead in 1 milliliter of blood by atomic absorption spectrophotometry have been developed. Methods that employ anodic stripping voltammetry suitable for the analysis of 0.1 milliliter of blood are now under development.
Duration: February 1971-January 1972.
Cooperating group(s): National Institutes of Health, Public Health Service, U. S. Depart-

ment of Health, Education, and Welfare; Thomas Wilson Foundation, Baltimore, Maryland; Women's Auxiliary, Happy Hills Hospital.

28-CB-1 A STUDY OF THE RELATIONSHIP BETWEEN CARDIOVASCULAR FITNESS AND IQ

Investigator(s): Geoffrey S. Beitner, B.A., Graduate Student, Southern Connecticut State College, New Haven, Connecticut 06515.
Purpose: To establish relationships between cardiovascular fitness and IQ; and to detect disorders in cardiovascular recovery rate.
Subjects: 70 randomly selected Negro males, ages 9 to 17, IQ range: 81-132 (high group) and 48-78 (low group).
Methods: The Modified Harvard Sequential Tests of Educational Progress (STEP) were administered to all subjects individually and were administered twice to obtain reliability. The sum of three pulse counts, taken at 45, 90 and 135 seconds, following exercise, was used for raw score recovery figure. (The lower the sum, the better the fitness.) Each group was considered separately in terms of IQ and cardiovascular fitness recovery. This relationship was compared in the low group and the high group.
Findings: Sixty-three percent of the low group improved between the two tests; 39 percent improved in the high group. Rank order for the low group revealed a positive relationship between the two variables: as IQ increases, raw cardiovascular score increases (recovery rates are worse). Rank order for the high group revealed a less significant relationship, since figures are close to zero. Overall, scores for both groups indicated better cardiovascular fitness with decrease in IQ—with a more significant relationship below an IQ of 80. No obvious, consistent, and stable relationship exists between cardiovascular fitness and IQ except in the low group. This indicated that cardiovascular fitness is not a function of IQ, but is dependent on the degree of dependence on physical activity.
Duration: February 1970-May 1970.
Cooperating group(s): Newsome Park Elementary School, Newport News, Virginia.

28-CB-2 SASKATCHEWAN GROWTH AND DEVELOPMENT STUDY

Investigator(s): Donald A. Bailey, Ph.D., Director, Growth and Development Study, and Associate Professor, School of Physical Education, University of Saskatchewan, Saskatoon, Saskatchewan, Canada.
Purpose: To evaluate changes occurring in strength, reaction time, body type, fitness performance, flexibility, anthropometric parameters, and physiological response to exercise from age 7 until adulthood; and to determine if such measured changes are related to participation and proficiency in sports or to the development of a positive attitude towards fitness and activity in later years.
Subjects: 190 boys and 80 girls. The 190 boys were part of the 214 grade 1 students randomly selected in 1964. An additional sample of 214 7-year-olds was also selected in 1964 to serve as a control group. At the end of the 15-year study, this sample will be tested and compared with the experimental group. Also, each year a control group of 7-year-olds is selected and tested once to check the reliability of testing methods and procedures.

Methods: The subjects are examined every summer using a 2-hour battery of tests that covers seven major factors: anthropometric measurements, flexibility, performance, body type, reaction time, strength, and physiological response to exercise. Questionnaires are completed each year to obtain data on physical activity, personality, and behavior. In addition, the Zimmerman Family Friend Questionnaire is administered, and a medical examination is given. Physiological response to exercise is evaluated by means of a treadmill run. The test involves a minute-to-minute collection of data obtained from a subject over 5 minutes of pre-exercise on a treadmill of progressively increasing speed and during a 10-minute recovery period. Heart rate, respiratory rate, ventilatory volume, as well as percentages of oxygen and carbon dioxide in the expired air are recorded for each minute of pre-exercise, exercise, and recovery.
Duration: 1964-1978.
Cooperating group(s): Canadian Fitness and Amateur Sport Directorate; Canadian Department of Health and Welfare.

28-CB-3 RELATIONSHIP OF MENARCHE AND OTHER ADOLESCENT EVENTS TO GROWTH IN WEIGHT AND HEIGHT

Investigator(s): Rose E. Frisch, Ph.D., Research Associate; and Roger Revelle, Ph.D., Director, Harvard Center for Population Studies, 9 Bow Street, Cambridge, Massachusetts 02138.
Purpose: To elucidate the mechanisms that trigger the adolescent spurt and menarche.
Subjects: Adolescent boys and girls of three completed longitudinal growth studies: the California Guidance Study, Child Research Council Study, and the Longitudinal Studies of the Harvard School of Public Health.
Methods: Methods are presented in the following publications: *Science*, 1970, 169; *Human Biology*, 1969, 41; *Human Biology*, 1971, 43; *Archives Disease Childhood* (in press).
Duration: 1971-1972.

28-CC-1 SENSORY DISCRIMINATION AND LEARNING IN HUMAN INFANTS

Investigator(s): Lewis P. Lipsitt, Department of Psychology, Graduate School, Brown University, University Hall, Box 1867, Providence, Rhode Island 02912.
Purpose: To continue the study of sensory and learning capacities of neonates and of children in the first year of life; specifically, to study behavior processes or changes in measured responses of infants over successive trials or with increased experience.
Subjects: Neonates.
Methods: Agencies supported by this research include (1) a neonatal sensory assessment and conditioning laboratory at the Providence Lying-In Hospital, (2) a behavior studies laboratory at St. Vincent's Home for Infants, where babies without parents reside from 5 days of age to adoption, and (3) follow-up studies on children first seen as newborns and returned to the Hunter Laboratory of Psychology at various ages up to 1 year. Techniques utilized include classical conditioning, instrumental learning, habituation procedures, and the exploration of the changing reinforcement value of objects and events in the infant's environment with increasing age.
Duration: September 1970-August 1971.

Cooperating group(s): National Institute of Child Health and Human Development, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-CC-2 DEVELOPMENTAL STUDIES OF SPEECH PERCEPTION

Investigator(s): Peter D. Eimas, Professor, Department of Psychology, Brown University, University Hall, Box 1867, Providence, Rhode Island 02912.
Purpose: To investigate phonemic perception and its development in infants and young children.
Subjects: Infants, 1 and 4 months old; children, ages 3, 5, and 7.
Methods: Infant Studies: The research investigates (1) infants' sensitivity to speech stimuli, (2) types of phonemic contrasts to which the infants are sensitive, (3) the nature of speech perception, and (4) differences in perceptual processes with speech and nonspeech auditory stimuli. A modified conjugate reinforcement procedure is used in which an auditory stimulus is made contingent upon the infant's sucking rate. When the infant's individual record indicates a diminution of the reinforcing properties of the first auditory stimulus, a secondary auditory stimulus is introduced. Recovery of the sucking response correlated with a shift in stimulation is taken as inferential evidence for discrimination of the sounds, provided appropriate control conditions are met. Studies with Children: These studies will examine speech perception during a period when language competence undergoes rapid growth and will provide information on the nature and development of speech perception. A variety of synthetic speech and nonspeech stimuli will be used. The methodology of the studies is similar to that used earlier in studies with adult listeners. The sounds are presented singly in random order for identification and in ABX triads for discrimination. Both infant studies and studies with children will provide data relevant to recent theoretical explanations of speech perception that have ignored developmental variables because of insufficient data.
Duration: September 1970-August 1971.
Cooperating group(s): National Institute of Child Health and Human Development, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-CE-1 EVALUATION OF NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN THE U. S.

Investigator(s): G. M. Owen, M.D., Professor; K. M. Kram, R.N., M.P.H., Nutritionist; P. J. Garry, M.S., Biochemist; and A. H. Lubin, M.D., Research Associate, Department of Pediatrics, Children's Hospital, Ohio State University, Ross Hall, Room 311, 561 South 17th Street, Columbus, Ohio 43205.
Purpose: To provide a descriptive overview of preschool children's nutritional status (dietary intakes and habits); clinical (medical and dental) examinations including measurement of height, weight, head circumference, and fatfold thickness; and biochemical tests (blood and urine).
Subjects: 3,500 boys and girls, ages 1 to 6, in 74 primary sampling units in 36 states and the District of Columbia.

Methods: A national probability sample was established. A full-time survey team interviewed the subjects at home from 1968 to 1970. Biochemical determinations will be made in one laboratory. Means, medians, frequency distributions, and percentile ranks will be determined. Data will be subjected to multiple comparisons and analysis of variance, factor analysis, and multiple regression analyses.
Findings: The nutritional status is generally related to or determined by socioeconomic status; however, in some specific indices, this was not true.
Duration: July 1966-June 1972.
Cooperating group(s): Survey Research Center, University of Michigan; Center for Human Growth and Development, University of Michigan; Battelle Memorial Institute, Columbus, Ohio; U. S. Department of Health, Education, and Welfare.
Publications: *Journal of Pediatrics,* 1971, 76, 761; and 1971, 78; *Clinical Chemistry,* 1970, 16, 766; and 1971, 17, 183 and 192.

28-CE-2 NUTRITIONAL STATUS OF MEXICAN-AMERICAN FARM WORKERS' CHILDREN

Investigator(s): H. Peter Chase, M.D., Assistant Professor of Pediatrics, University of Colorado Medical Center, Denver, Colorado 80220.
Purpose: To determine the nutritional and health problems of Mexican-American farm children.
Subjects: 300 children, ages 0 to 6, of Mexican-American farm workers.
Methods: Physical examination, medical and social history, and laboratory data were collected on all subjects. All examination and historical data were correlated statistically. The laboratory data were computer analyzed.
Findings: Sixty-seven percent of the children were deficient in Vitamin A, and these same children had statistically higher incidence of skin infections (10 percent of the children) and upper respiratory tract infections (approximately 10 percent). Ten percent of the children had low total serum protein levels, and these were usually children who did not drink milk.
Duration: June 1969-completed.
Cooperating group(s): Colorado Migrant Council.
Publications: *American Journal of Diseases of Childhood* (in press).

28-CE-3 HUMAN PROTEIN MALNUTRITION

Investigator(s): J. D. L. Hansen, M.D., F.R.C.P., Associate Professor, Department of Pediatrics, Transvaal Memorial Hospital for Children, Joubert Street Ext, Johannesburg, South Africa; A. D. Moodie, A.R.S.H., A.M.S.I., Research Social Worker; and M. P. Keet, M.Med., Consultant Pediatrician, Department of Pediatrics and Child Health, Medical School, University of Cape Town, South Africa.
Purpose: To determine if protein-calorie malnutrition during the preschool years exerts any long-term or irreversible effects on the individual's health.
Subjects: 123 children who experienced kwashiorkor between 10 months and 4 years; and their siblings.
Methods: Anthropometric measurements are taken at 6 monthly intervals. Psychological assessment of 40 of these subjects and 40 siblings was made during the tenth year of

follow-up and will again be made at the fifteenth year.
Findings: Prepubertal nutritional growth retardation is reversible when the child is given proper treatment and an improved environment. A single nutritional insult does not demonstrably impair long-term intellectual development.
Duration: 1960-1980.

28-CF-1 MUSCULOSKELETAL DEFORMITIES OF THE NEWBORN

Investigator(s): Robert S. Siffert, M.D., Professor and Chairman; and Jacob F. Katz, M.D., Professor of Clinical Orthopedics, Department of Orthopedics, Mount Sinai School of Medicine, New York, New York 10029.
Purpose: To detail anatomical clarification of the orthopedic nature of congenital deformities.
Subjects: Stillborns.
Methods: All stillborns with obvious musculoskeletal deformities are studied by angiography, roentgenography, and anatomical dissection.
Duration: 1969-continuing.
Cooperating group(s): The Smart Foundation.

28-CF-2 ACCUMULATION OF FALLOUT NUCLIDES IN TEETH AND BONE

Investigator(s): Harold L. Rosenthal, Ph.D., Professor of Physiological Chemistry, School of Dentistry, Washington University, 4559 Scott Avenue, St. Louis, Missouri 63130.
Purpose: To study the rate of accumulation, retention, and turnover of strontium-90 in the teeth of children as an index of dietary strontium-90; and to determine the possible long-term effects of such deposition on the development of children.
Subjects: Children born since January 1948.
Methods: Deciduous teeth of the children are collected and measured for strontium-90 content. Correlations between sound and carious teeth, teeth of children who were breast fed versus teeth of children who were bottle fed, and teeth of children living in other areas of the world are studied. Additional studies of strontium-90 content of human fetal bone and tooth buds are in progress, as well as studies of nuclide content of permanent teeth. The data obtained are correlated with the dietary strontium-90 burden of the mother and the children. These correlations show a linear relationship between tooth strontium-90 and dietary nuclide burden. With due regard to discrimination factors and time of tooth formation, the equations make it possible to predict the strontium-90 burden of children from the nuclide concentration of commercial milk sources.
Duration: 1959-1976.
Cooperating group(s): Environmental Control Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-CF-3 DETERMINANTS OF DENTAL DEVELOPMENT

Investigator(s): Harry Israel, Ph.D., D.D.S., Senior Investigator, Fels Research Institute for the Study of Human Development, 800 Livermore Street, Yellow Springs, Ohio 45387.

Purpose: To investigate dental and craniofacial development.
Subjects: Infants to 18-year-olds.
Methods: The research is a radiogrammetric and anthropometric approach to dental development. Tooth formation and eruption sequences are elucidated. Bone growth in the mandible and cranial base is under investigation in order to understand normal human development.
Findings: The findings emphasize milestones in somatic growth, such as tooth formation and eruption. In addition, information is available on bone growth in the mandible as it relates to quantity and sexual dimorphism.
Duration: 1960-1972.
Cooperating group(s): National Institute of Dental Research, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-CF-4 A CLINICAL RESEARCH STUDY OF CONGENITAL HAND ANOMALIES

Investigator(s): Adrian E. Flatt, M.A., M.D., F.R.C.S., Project Director, Congenital Hand Research Study, and Professor, Department of Orthopedics, Division of Hand Surgery, Children's Hospital, University of Iowa, Iowa City, Iowa 52240.
Purpose: To identify the number of patients in Iowa with congenital hand anomalies, the familial incidence of an anomaly, to classify the hand deformities, to establish the functional disabilities, to correlate structural deficiency with functional impairment, and to assess the results of surgical treatment in terms of function.
Subjects: Approximately 1,170 patients, newborn to aged, of both sexes, from every economic level.
Methods: Names of patients are collected from University of Iowa Hospital records over the last 50 years, from doctors throughout the state, and from Crippled Children's field clinics.
Findings: Rare conditions have been discovered that have only occasionally or never been reported in the literature.
Duration: July 1966-June 1971.

28-CG-1 BIORHYTHMS OF CHILDREN DURING FREE PLAY

Investigator(s): Michael G. Wade, Ph.D., Assistant Professor; and Michael J. Ellis, Ph.D., Director, Motor Performance and Play Research Laboratory, Children's Research Center, University of Illinois, South First Street, Champaign, Illinois 61820.
Purpose: To examine the effects of stimulus complexity on the activity patterns of young children.
Subjects: 16 normal kindergarten children; 8 boys and 8 girls.
Methods: Electrocardiograms of the children were recorded using a telemetry system, which allowed free-range movement of the children. Spectral analysis of continuous electrocardiograms was made in a groups X apparatus X sex factorial design.
Findings: Periodicity of 40 minutes and 15 minutes was identified.
Duration: 1971-1972.
Publications: Wade, Michael G. and Ellis, Michael J. Measurement of free range activity in children as modified by social and environmental complexity. *American Journal of Clinical Nutrition* (in press).

28-CH-1 SOCIAL CONTEXT EFFECTS ON LANGUAGE AND COMMUNICATION

Investigator(s): Elliot G. Mishler, Ph.D., Associate Professor; and Jean Berko Gleason, Ph.D., Research Associate, Department of Psychiatry, Harvard Medical School, Cambridge, Massachusetts 02138; and Massachusetts Mental Health Center, 74 Fenwood Road, Boston, Massachusetts 02115.
Purpose: To determine the effects of different social contexts, particularly the social attributes of others and differential task demands, on variations in speech.
Subjects: First graders of various social classes.
Methods: Experimental methods are being developed to provide subjects with standard situations (within their range of linguistic competence) that will encourage speech variation. Methods of coding and analysis are being developed.
Duration: September 1970-August 1972.
Cooperating group(s): National Science Foundation.

Intellectual

28-DB-1 COMPARISON OF MENTAL ABILITIES OF LOW SES 5-YEAR-OLD NEGRO AND WHITE CHILDREN ON INDIVIDUAL INTELLIGENCE MEASURES

Investigator(s): Carol Paula Takacs, Ph.D., Assistant Professor, College of Education, Cleveland State University, Euclid at East 24th, Cleveland, Ohio 44115.
Purpose: To investigate children's cognitive abilities.
Subjects: 120 Title I pupils, ages 5 years to 6 years 10 months. Equal numbers of males and females, and equal numbers of Negroes and Caucasians were studied.
Methods: The Wechsler Preschool and Primary Scale of Intelligence and the Merrill-Palmer Test of Thinking Abilities (in revision stage; not ready for publication) were administered to subjects on two separate occasions. Factor analysis and analysis of variance were performed on the test scores. The structures of intellectual factors in the various sex and race groups were compared statistically.
Findings: The black children scored significantly lower than the white children on the factors of spatial organization and verbal comprehension. There were no differences between the groups on the factors of ideational fluency, language problem solving, and originality. The intellectual factor structure of the two racial groups was highly similar but was somewhat different for the two sex groups.
Duration: Summer 1969-June 1971.
Cooperating group(s): Graduate School, Kent State University.
Publications: *Dissertation Abstracts.*

28-DB-2 A STUDY OF PARENTAL INFLUENCE IN A COGNITIVE TASK

Investigator(s): Nancy Hamblen Acuff, M.S., Director, Child Study Center, and Assistant Professor of Education, East Tennessee State University, P.O. Box 2345, Johnson City, Tennessee 37601.
Purpose: To investigate the immediate effectiveness of parental instruction on children's performance of a selected cognitive task.

Subjects: 42 children, ages 4 to 5; 21 mothers and 21 fathers. Subjects were from varied socioeconomic backgrounds. All children were from father-present homes.
Methods: Children were randomly assigned to experimental and control groups. The Draw-A-Man test was administered as a pre- and posttest. If the examiner on the pretest was male, the father administered the posttest; if female, the mother administered the posttest. Instruction in drawing was given to each child by one of his parents. Subjects were observed, and videotapes were made through a one-way screen. Analysis of variance was used to assess the results.
Duration: October 1970-June 1971.

28-DB-3 STUDIES IN COGNITIVE DEVELOPMENT

Investigator(s): Rochel Gelman, Ph.D., Assistant Professor, Department of Psychology, University of Pennsylvania, 3813-15 Walnut Street, Philadelphia, Pennsylvania 19104.
Purpose: To assess cognitive development in preschool and elementary school children.
Subjects: Approximately 300 children, ages 2½ to 8.
Methods: A modified magic show will be used to investigate the number concepts of preschool children. Research on children's understanding of logical connectives involves a game that requires children to follow compound commands that contain connectives.
Findings: Preschool children exhibit an invariance rule that treats small numbers as invariant through displacements but not through addition and subtraction.
Duration: September 1969-September 1972.

28-DB-4 THE DEVELOPMENT OF COGNITION IN THE FIRST 3 YEARS OF LIFE AND ITS RELATION TO MOTHER-CHILD INTERACTION: A STUDY OF DISADVANTAGED NEGRO CHILDREN

Investigator(s): Silvia M. Bell, Ph.D., Assistant Professor, School of Medicine, Johns Hopkins University, Baltimore, Maryland 21205.
Purpose: To study early cognition, especially symbolic representation and internalized thought; and to relate intellectual growth during the child's first 3 years to the quality of mother-child interaction.
Subjects: 36 black infants of low socioeconomic status.
Methods: The children are observed in a free play situation with their mothers for 10 sessions held at regular intervals from the age of 8 to 36 months. Each session is 2 to 3 hours long. Various aspects of cognition, including object permanence, causality, imitation, and symbolic thinking that are reflected in the children's play, are studied. A test of infant-mother attachment is administered at 12 months. The principal maternal care variables associated with advanced forms of cognitive functioning in young children will be identified.
Duration: June 1970-August 1973.
Cooperating group(s): Office of Education, U. S. Department of Health, Education, and Welfare.
Publications: *Child Development,* 1970, 41, 291-311.

28-DD-1 EFFECTS OF ENVIRONMENT ON THE DEVELOPMENT OF THE YOUNG CHILD

Investigator(s): Jean C. Watts, Ph.D., Research Associate and Lecturer, Graduate School of Education, Harvard University, 420 Larsen Hall, Appian Way, Cambridge, Massachusetts 02138.
Purpose: To demonstrate the influence of human and material environments on the intellectual and social development of young children.
Subjects: 40 children, ages 1 to 3.
Methods: The subjects are observed in their homes for 40 hours at intervals in their second and third year. The collected data include (1) the child's moment-to-moment experiences, (2) the frequency and quality of the child's interaction with others, and (3) the degree of attention the child pays to social versus nonsocial environmental objects. Tests of social and intellectual competence are administered four times a year. The study focuses on differences in the environment of children who develop well and those who develop poorly.
Findings: Young children interact more often with things than people. Mothers spend little time in direct teaching.
Duration: July 1969-June 1972.
Cooperating group(s): Head Start, Office of Child Development, U. S. Department of Health, Education, and Welfare.

28-DE-1 DETERMINERS OF ATTENTION IN MATCHING-TO-SAMPLE BY CHILDREN: THE EFFECTS OF PRETRAINING

Investigator(s): J. Grayson Osborne, Ph.D., Assistant Professor, Department of Psychology, Utah State University, Logan, Utah 84321.
Purpose: To determine the variables that control matching behavior in children when compound visual stimuli are employed.
Subjects: 20 children of normal intelligence, ages 4 to 5.
Methods: After pretraining with different kinds of simple figural stimuli in matching-to-sample, the children will match compound figural stimuli that occasionally contain probes (consisting of earlier experienced stimuli). Their probe choices will reflect the controlling stimuli on each trial; and, consequently, the stimuli to which they attend or do not attend.
Duration: July 1970-June 1971.

28-DF-1 COPING STYLE AND ACHIEVEMENT: A CROSS-NATIONAL SURVEY OF SCHOOL CHILDREN

Investigator(s): Robert F. Peck, Ph.D., Professor and Director, Personality Research Center, University of Texas, Austin, Texas 78712; and Arrigo L. Angelini, Ph.D., Professor and Director, Instituto de Psicologia, Universidade de Sao Paulo, Caixa Postal 8,105, Sao Paulo, Brazil.
Purpose: To identify and develop ways to measure styles of coping with work-related problems among children and adolescents in different cultures and subcultures.
Subjects: 800 school children, ages 10 and 14, in each country: Brazil, England, Ger-

many, Italy, Japan, Mexico, and the United States; who belong to the upper middle and upper lower social classes.

Methods: The children were administered a diversified assessment battery to test a large number of hypotheses regarding complex interrelations among age, sex, socio-economic class, and national culture. Other factors tested included aptitude, vocational aspirations and expectations, study habits, and school achievement. The investigators attempted to develop a theory of coping behavior and attempted to devise and improve projective instruments to determine operational units of coping behavior.

Duration: 1965-1971.

Cooperating group(s): Office of Education, U. S. Department of Health, Education, and Welfare.

28-DF-2 DEVELOPMENT OF LOGICAL THINKING

Investigator(s): Edith Neimark, Professor, Department of Psychology, Rutgers, The State University, Old Queens Building, New Brunswick, New Jersey 08903.

Purpose: To investigate the development of logical thinking in elementary school children.

Subjects: Groups of children in grades 3 to 6, and a control group.

Methods: The longitudinal development of formal operational thought is studied by testing groups of the subjects two to four times a year on a problem solving task over a period of up to 4 years. (A comparison of the performance of children tested for 2 years with the performance of a control group tested for the first time shows that repeated testing per se has no effect upon the rate of development.) Additional intelligence, achievement, and style measures (e.g., IQ, school achievement tests, Matching Familiar Figures, Embedded Figures, and Raven Matrices), as well as additional measures of cognitive level (e.g., a number of Piagetian tasks) have been administered to each child to assess intercorrelations.

Findings: Development proceeds through relatively discrete stages; no measure which is diagnostic of future progress has been identified.

Duration: September 1970-August 1971.

Cooperating group(s): National Institute of Child Health and Human Development, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-DH-1 SOCIAL CLASS AND THE DEVELOPMENT OF COMMUNICATION

Investigator(s): J. McVicker Hunt, Ph.D., Professor of Psychology and Education; and Girvin E. Kirk, Ph.D.; Ed.D., Research Assistant Professor of Psychology, Department of Psychology, Univeristy of Illinois, Urbana, Illinois 61801.

Purpose: To compare the facility with which middle class nursery school children and Head Start children identify and communicate information about color, position, and number; to determine the developmental sequence of communication; and to invent games to facilitate the ability to communicate.

Subjects: Nursery school children and Head Start children.

Methods: All subjects are given criterion-referenced tests of color, position, and number identification.

Findings: Head Start children are just as competent as nursery school children in utilizing color, placement, and information in imitations. They are not as competent in naming and much less competent in communication.
Duration: June 1970-August 1974.
Cooperating group(s): Head Start Program, Danville, Illinois; Children's Bureau, Office of Child Development, U. S. Department of Health, Education, and Welfare.

28-DH-2 SECOND LANGUAGE LEARNING IN CHILDREN WITH RETARDED LANGUAGE DEVELOPMENT

Investigator(s): M. Sam Rabinovitch, Ph.D., Associate Professor, Psychology Department, McGill University, Montreal 110, Quebec, Canada.
Purpose: To determine the effect of an immersion program in second language learning (French) on children with slow language development.
Subjects: 60 kindergartners enrolled in an immersion French program at a public school; a control group of children who proceed through the regular public school program in English; and another control group of children who have no language development deviation, and who proceed through the French immersion program.
Methods: Language and intelligence tests will be administered to all subjects at 6-month intervals for 2 years.
Duration: Fall 1970-not reported.
Cooperating group(s): Public school system.

28-DH-3 DEVELOPMENT OF A LANGUAGE LABORATORY FOR 3-YEAR-OLDS

Investigator(s): Richard Elardo, Ph.D.; Phyllis Elardo, Ph.D.; Faustenia Bomar, M.A.; and Shelvie Hawk, M.A., Center for Early Development and Education, University of Arkansas, 814 Sherman, Little Rock, Arkansas 72202.
Purpose: To provide a systematic series of daily language experiences to improve the verbal communication skills of disadvantaged children during their language and cognitive development.
Subjects: 20 disadvantaged children, age 3.
Methods: Subjects will be divided into experimental and control groups on the basis of their performance on the Stanford-Binet, the Illinois Test of Psycholinguistic Abilities, and the Inventory of Home Stimulation. Equal proportions of high scorers will be assigned to experimental and control groups. Beginning in September 1971, the 10 experimental children will attend the language laboratory each school day for 20 minutes. A formal training curriculum that employs behavioral objectives for the linguistic and cognitive areas will be employed. Control children will attend the laboratory each day for a 20-minute free play session with the experimenters present. Final evaluation will involve the readministration of the premeasures in spring 1972.
Duration: September 1971-August 1972.
Cooperating group(s): College of Education, University of Arkansas.

28-DH-4 CONCEPTUAL DEVELOPMENT AND LANGUAGE COMPREHENSION

Investigator(s): J. Huttenlocher, Professor, Department of Psychology, Columbia University, 118 Main Hall, New York, New York 10027.
Purpose: To explore the relationship between young children's conceptual development and their comprehension and use of language.
Subjects: Preschool children.
Methods: The experiments fall in two categories: (1) Studies of the role of extralinguistic context in small children's comprehension. The investigator plans to systematically analyze the types of relationships an utterance may have to its context and to examine the effects on the listener's comprehension task; to evaluate precisely how much children at various ages rely on context; and to consider how context is used in learning. (2) Studies of the development of the child's ability to comprehend statements that categorize and order objects according to various properties and qualities; e.g., physical characteristics of height and shape. Several experiments concern comprehension of order as described in comparative statements and linear syllogisms.
Duration: September 1970-August 1971.
Cooperating group(s): National Institute of Child Health and Human Development, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare.

Personality

28-EA-1 KINDERGARTEN DIAGNOSIS AND REMEDIATION

Investigator(s): Theodore B. Cohen, M.D., School Consultant, Frankford Friends School, 421 Hidden River Road, Narberth, Pennsylvania 19072.
Purpose: To verify Dr. William Stennis' (Bucks County Title III Research) method of developmental classification and teaching strategies.
Subjects: 27 kindergarten children, 5 years old, who attended Frankford Friends School, Philadelphia in 1969; 17 boys and 10 girls.
Methods: The kindergarten teacher filled out the Stennis forms after 6 weeks of observation. The children were placed in three groups: (1) oedipal conflict, (2) developmental arrest, and (3) ego disturbed. These groups were studied in first grade beginning in September 1970. Stennis teaching strategies were also used in the first grade. Three of the developmentally arrested children were referred for diagnostic study and treatment. One developmentally arrested child repeated kindergarten. The children will be serially studied through grade 6.
Findings: The classification system was helpful for the teachers. Results show 11 percent fewer developmental arrests than in the Bucks County Schools, and that only the boys developed developmental arrests and ego disturbance during 1969.
Duration: 1969-1976.

28-EA-2 CHARACTER EDUCATION IN INFANCY

Investigator(s): Lucie W. Barber, Ed.D., Research Associate, Character Research Project, Union College, 10 Nott Terrace, Schenectady, New York 12308.
Purpose: To improve parent-infant communication through a planned curriculum in order to take advantage of the infant's potential.
Subjects: 30 middle class families with infants, ages 0 to 30 months; and a control group.
Methods: The raw data consist of parent reports written in the first person as though the infant were speaking. Categories of behavior reported are oral and visual, verbal, manipulative, emotional, social, and motor. The child's development is compared to Gesell norms.
Findings: There is acceleration in behaviors investigated. There is progress in value integration and social effectiveness when the infants are compared with a control group of similar socioeconomic status. The curriculum is being revised and another voluntary sample will be enrolled.
Duration: 1967-1975.
Cooperating group(s): Union College Character Research Project; Lilly Foundation, Indianapolis, Indiana.
Publications: *Character Potential,* 1971, 5(3).

28-EA-3 DEVELOPMENT OF AFFECT DURING THE FIRST YEAR OF LIFE

Investigator(s): Robert N. Emde, M.D.; D. R. Metcalf; and K. L. Koenig, Department of Psychiatry, School of Medicine, University of Colorado, 4200 East 9th Avenue, Denver, Colorado 80220.
Purpose: To describe the development of smiling and crying behaviors during the first year of life.
Subjects: Infants.
Methods: A longitudinal study during the first year will attempt to establish correlates between maturation of the central nervous system and development of affective behaviors in individual infants who are followed from before birth through the first postnatal year. A series of cross-sectional studies will attempt to relate neonatal smiling, frowning, and other behaviors to rapid eye movement states.
Duration: September 1970-August 1971.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-EB-1 DIFFERENTIAL RESPONSE PATTERNS AS THEY AFFECT THE SELF-ESTEEM OF THE CHILD

Investigator(s): Thomas W. Miller, Ph.D., Director, Counseling Services, and Assistant Professor of Psychology, Rosary Hill College, Buffalo, New York 14226.
Purpose: To discover how parental attitudes are related to parents' responses to their child's behavior in both positive and negative situations; and to determine the effects on the self-esteem of the child of parents' use of descriptive and judgmental responses in reaction to their child's behavior.

Subjects: 203 eighth graders randomly selected from inner city, peripheral city, and suburban schools in northeastern United States; and their mothers.
Methods: The Parental Response Inventory (PRI) was developed to assess the degree of descriptiveness of the parent and was used in a preliminary inquiry and pilot study. The PRI (Miller, 1969) was administered to the mothers, and the Self-Esteem Inventory (SEI) (Coopersmith, 1960) was administered to the children. The PRI consists of 12 prepared situations and a choice of four alternatives for each situation. Six of the situations involve behavior of a positive nature; six involve behavior of a negative nature. The SEI is a 58-item inventory with five subscales: general self, social self, home-parent, school-academic, and an estimate of social desirability. An analysis of the data utilized the multiple correlation, multiple regression, and multivariance analysis of variance models. The independent variable was the score obtained on the PRI, and the dependent variable was the score obtained on the SEI. A 2 x 2 (sex by race) analysis of variance was computed to test for the mean differences between the inner city and the suburban samples.
Findings: The data confirmed the relationship between maternal descriptiveness in negative situations and the self-esteem of the child for inner city males and females only. Correlation coefficients were positive, substantial, and in the predicted direction. Significance testing was at the .05 level. The results suggest that the more descriptive the parent, the greater the self-esteem of the child; and the more judgmental the parent, the lower the self-esteem of the child. The most interesting findings are that this was found to be true only for inner city black children.
Duration: February 1970-June 1972.
Cooperating group(s): State University of New York; National Science Foundation.

28-EE-1 SECOBARBITAL AND FAMILY PROBLEM SOLVING

Investigator(s): David Reiss, M.D., Chief, Experimental Group and Family Studies Section, Adult Psychiatry Branch, National Institute of Mental Health, Building 10, Room 2N210, 9000 Rockville Pike, Bethesda, Maryland 20014.
Purpose: To compare the effects of psychiatric status and secobarbital administration on family problem solving.
Subjects: 24 white, middle class family triads. Each triad consisted of parents and an older adolescent. The sample was evenly divided between male and female adolescents.
Methods: The research employed a 2 x 2 factorial design: Factor A consisted of families with psychiatric patients versus normal families; Factor B consisted of families in which the child received an active drug versus families in which the child received a placebo. The active drug was 175 milligrams of secobarbital given on a double blind basis. The design included a pretest on one evening and drug administration and a posttest the following evening. Problem solving effectiveness and style of a family unit and speech rates, statement lengths, and speech interruptions were assessed.
Findings: Secobarbital administration did not influence family problem solving, but it increased speech rate and interruption rate in both the offspring and his parents. A wide variety of secondary analyses suggested that family problem solving effectiveness and style is stable and relatively invulnerable to the kind of acute attentional and cognitive deficit produced by secobarbital; however, changes in speech patterns were interpreted as reflecting the family's attempt to keep its somewhat obtunded, drugged child integrated to the family unit.
Duration: Fall 1968-summer 1971.
Cooperating group(s): Harvard Medical School.

28-EG-1 FOLLOW-UP STUDY OF THERAPEUTIC ABORTION WITH REFERENCE TO PRE- AND POSTABORTION PSYCHOSOCIAL ADJUSTMENT

Investigator(s): Lydia Rapoport, M.S.S., Professor, School of Social Welfare, University of California at Berkeley, Berkeley, California 94720.
Purpose: To assess the effect of therapeutic abortion on women; to try to identify factors that may indicate high risk patients; and to improve the quality of service to these women.
Subjects: 18 women, ages 16 to 39.
Methods: The women were interviewed 2 to 3 weeks after legal therapeutic abortions were performed.
Findings: Inadequacy of medical preparation, particularly for amnioinfusion, and degree of psychosocial support are two key factors that are important in a woman's subsequent postabortion adjustment.
Duration: Spring 1970-completed.
Cooperating group(s): Kaiser Hospital, Obstetrics and Gynecology Department, Oakland, California.

Social

28-FA-1 MEASUREMENT AND REMEDIATION OF SOCIAL COMPETENCY DEFICITS

Investigator(s): John E. de Jung, Ed.D., Professor of Education; and Barbara T. Edmonson, Ed.D., Research Associate, University of Oregon, 1609 Agate Street, Eugene, Oregon 97403.
Purpose: To measure and improve the social competency of junior high school students of low socioeconomic status; and, concurrently, while examining other measures relevant to successful social conduct, to modify and validate the Test of Social Inference.
Subjects: Study I: Approximately 750 to 850 junior high school students in Oregon public schools. Study II: 800 to 1,000 retarded special education pupils and 150 nonretarded pupils from eight geographical regions.
Methods: Study I: The target population was interviewed, tested, and observed to identify the crucial differences among pupils viewed by teachers and counselors as socially incompetent, average competent, and noticeably competent. An education program, intended to improve the social competency skills of the pupils, will be prepared and given controlled try-outs in public school settings. Study II: Scores of subjects on the Test of Social Inference were collected for analysis.
Findings: Midway in the initial phase study groups have been identified, and the reliability of instruments has been ascertained.
Duration: May 1969-April 1972.
Cooperating group(s): Social and Rehabilitation Service, U. S. Department of Health, Education, and Welfare; University of Oregon.

28-FA-2 TRAINING AND TRANSFER OF COOPERATIVE BEHAVIOR IN 3-YEAR-OLD CHILDREN

Investigator(s): Anthony Epworth, Ph.D., Assistant Professor, Department of Psychology, New York State University College at Cortland, Cortland, New York 13045.
Purpose: To determine the parameters of the cooperative behavior of young children for future application in clinical and educational settings.
Subjects: 60 children, ages 36 to 42 months.
Methods: The research is an operant study of dyadic behavior in which a common response of two alternatives is required for reinforcement. Experimental groups differ in reinforcement contingencies assigned, while control groups receive unsystematic reinforcement.
Findings: Results indicate that cooperative behavior is a function of both the available reinforcement contingencies and the availability of social discriminative stimuli, while transfer of cooperative behavior is a function of task similarity.
Duration: December 1970-February 1971.
Cooperating group(s): New York State University College, Cortland.

28-FA-3 SOCIAL INFLUENCE ON CHILDREN'S STANDARDS

Investigator(s): Herbert D. Saltzstein, Ph.D., Associate Professor, Herbert H. Lehman College, City University of New York, Bronx, New York 10468.
Purpose: To investigate the processes by which children's judgmental, perceptual, and moral standards may be socially influenced.
Subjects: Children, kindergarten to grade 7; and college students.
Methods: Interviews and laboratory test situations will be used to collect the data. Situations to be investigated include (1) children's understanding of interdependent (team) situations and the influence demands that arise from them, and (2) the effect of role-taking on moral reasoning.
Duration: September 1970-not reported.

28-FB-1 EXPERIMENTAL ANALYSIS OF CROSS-SEX BEHAVIOR IN MALE CHILDREN

Investigator(s): George A. Rekers, B.A., Ph.D. Candidate; and O. Ivar Lovaas, Ph.D., Professor, Department of Psychology, University of California at Los Angeles, Los Angeles, California 90024.
Purpose: To apply behavior modification techniques to the reduction of effeminate behaviors in children with cross-gender identification.
Subjects: Male children who exhibit cross-gender identification.
Methods: Employing an independent multiple baseline design, the discriminative stimulus functions and the reinforcement functions involved in the maintenance of this pathology have been delineated. In this context, reliable multiple behavioral measures of play preferences, verbal behavior, and mannerisms have been developed.
Findings: A significant reduction of deviant behavior in the first subject has resulted from this detailed, applied behavioral analysis; analyses of four other patients are in progress. Cross-sex behaviors have been found to be situation-specific, governed by identifiable discriminative stimulus and reinforcement functions.
Duration: July 1970-July 1972.

28-FC-1 A SURVEY OF THE CURRENT USE OF EUPHORIC HASHISH DRUGS AND NARCOTICS AMONG UNIVERSITY STUDENTS IN DENMARK

Investigator(s): Jacob Vedel-Petersen, Research Director; and Boel Ulff Møller, Research Associate, Danish National Institute of Social Research, Boregergade 28, Copenhagen, Denmark.
Purpose: To assess the current misuse of drugs and narcotics among Danish university students; and to prepare for a 1972 follow-up study in which the careers of users will be followed, and comparisons will be made between academic success and the use of hashish drugs and narcotics.
Subjects: Approximately 6,500 students enrolled in fall 1967 at three universities and at schools for doctors of dentistry, agriculture, veterinary medicine, and engineering.
Methods: This study is the second in a series on drug abuse. The use of tobacco, liquor, drugs, and hashish among secondary school students and trainees at vocational institutes was studied. (The use of euphoria amongst adolescents in 1968. *Socialt Tidsskrift,* nr. 4, 1969.) For the present study, a 46-page questionnaire was mailed to students in institutions of higher learning. The data are being tabulated and will be compared now and after the follow-up study in 1972.
Findings: Fifty-five percent of the questionnaires have been returned. They indicate that 37 percent of the subjects have tried hashish; 2 percent use it routinely; and 5 percent have tried drugs and narcotics.
Duration: Spring 1970-summer 1971.
Cooperating group(s): Danish National Institute of Social Research.

28-FD-1 A DEVELOPMENTAL STUDY OF ROLE CONCEPTS

Investigator(s): Seymour Friedland, Ph.D., Assistant Professor, Eliot-Pearson Department of Child Study, Tufts University, Medford, Massachusetts 02155.
Purpose: To examine the cognitive characteristics of role; that is, to determine if children rely on concrete specific acts and attributes or general functions of adults to form their role conceptions.
Subjects: 60 middle class children in grades 1, 3, and 6; 10 boys and 10 girls in each grade.
Methods: The research uses concept formation methodology in the area of social roles. Children are given examples of a number of adults participating in the same role, but performing different acts. The child's task is to indicate how the two are the same. The child's response is classified in terms of its reliance on concrete acts or perceptual attributes versus abstract or general functions. Adult role concepts presented to the children include: policeman, scientist, soldier, student, and artist.
Findings: Role concepts show progression with age; from role notions identified by specific acts, to those characterized by general functions.
Duration: March 1970-January 1971.

SPECIAL GROUPS OF CHILDREN

Physically Handicapped

28-GC-1 CHILD AMPUTEES: ANTECEDENTS AND OUTCOMES

Investigator(s): G. E. Sharples, Ph.D., Assistant Professor; and Ronald L. Crawford, Ph.D., Assistant Professor and Associate Project Director, School of Public Health, University of Michigan, 122 South First Street, Ann Arbor, Michigan 48103.
Purpose: To initiate a follow-up study of individuals with congenital or childhood-acquired limb deficiencies.
Subjects: Approximately 500 upper unilateral and bilateral and lower unimembral amputees; who, when they were children, were patients at the Area Child Amputee Center, Grand Rapids, Michigan.
Methods: The subjects were all interviewed at home. Data collected concerned childhood, teen, and adult experiences; use of prostheses; physical, social, and psychological function; and numerous related topics. The data are currently being analyzed. Additional studies will be concentrated in areas of salient findings, including follow-up care, social and prosthetic services, and teen counseling.
Duration: 1966-1972.
Cooperating group(s): Area Child Amputee Center, Grand Rapids, Michigan; Crippled Children's Commission, Michigan State Health Department; Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: The preliminary report is available from the investigators.

28-GC-2 THE ACQUISITION OF SIGN LANGUAGE AND ITS STRUCTURE

Investigator(s): Ursula Bellugi, Ed.D., Director of Laboratories, The Salk Institute, La Jolla, California 92037.
Purpose: To analyze the acquisition of sign language and its structure in deaf persons.
Subjects: Four mother-child pairs, composed of deaf children of deaf parents, who use sign language as their principal mode of communication; deaf children and deaf adults who are "native signers."
Methods: Mother-child interaction in sign language is videotaped at monthly intervals and analyzed. Grammars of mother and child language are constructed. Communication studies are conducted with adults and children. An analysis of structure and acquisition of sign language is made.
Duration: May 1971-April 1974.
Cooperating group(s): National Institute of Neurological Diseases and Stroke, National Institutes of Health, Public Health Service, U. S. Department of Health, Education, and Welfare; Linguistics Department, University of California at San Diego.

28-GF-1 THE MEANING OF DISABILITY TO THE PARENTS OF THE DISABLED

Investigator(s): Margaret Voysey, B.Sc., Research Student, Department of Sociology, University of Aberdeen, Aberdeen AB9 2UR, Scotland.

Purpose: To investigate parents' reactions to their disabled child; that is, how they discover what is wrong with the child; how they construct a definition of him congruent with his appearance to them; how they manage the impressions the child makes on others; and how they construct an ideology that makes sense of their suffering and sacrifice.

Subjects: 21 families, each with a child experiencing a serious and permanent disabling condition. Children, ages 3 weeks to 10 years; sex ratio: 14 males, 7 females.

Methods: Cases were obtained from outpatient clinics and wards of local children's and maternity hospitals. Each family was visited for a period of 1½ hours, four times, over 12 months. Open-ended question interviews were tape recorded and transcribed. The data were indexed and analyzed.

Findings: (1) Speed of onset of the disability, clarity of diagnosis, and certainty of prognosis (as defined by the parents) are three dimensions of the context within which the definition of the child's disability is constrained. (2) Parental strategies that involve the disabled offspring appear to be strongly influenced by whether the parents feel responsible for the child's condition, and whether they can do anything to influence it. (3) Elements of an ideology constructed by parents of a disabled child include loss of the taken-for-granted attitude, redefinition of good and evil, and the acceptance of the positive value of suffering.

Duration: October 1966-September 1971.

Cooperating group(s): Nuffield Provincial Hospital Trust.

Publications: Horobin, Gordon and Voysey, Margaret. Sociological perspectives on brain damage. In P. Black (Ed.), *Brain damage in children: Etiology, diagnosis and management*. Baltimore, Maryland: The Williams and Wilkins Co. (in press).

Mentally Retarded

28-HC-1 LINGUISTIC COMPETENCE OF MENTALLY RETARDED CHILDREN

Investigator(s): Oliver L. Hurley, Ph.D., Associate Professor, Ferkauf Graduate School of Humanities and Social Sciences, Department of Special Education, Yeshiva University, 55 Fifth Avenue, New York, New York 10003.

Purpose: To measure and describe the linguistic competence of mentally retarded children; to identify and distinguish language performance variables; and to provide information needed for the development of teaching strategies and materials.

Subjects: Trainable and educable mentally retarded children, ages 3 to 10.

Methods: Children's responses to standard pictures are taped and analyzed using a combination of Loban's and Strickland's techniques. The Fraser-Bellugi-Brown Comprehension-Production-Imitation Test is administered. Developmental-remedial teaching will be planned for each child on the basis of the analysis, and at the same time, a new group of children will begin the process. Eventually, samples will include mentally retarded children who differ in degree of retardation, cultural background, and age; so that cross-comparisons may be made, and effective remedial techniques may be identified.

Duration: July 1970-January 1973.
Cooperating group(s): Bureau of Education for Handicapped, Office of Education, U. S. Department of Health, Education, and Welfare.

28-HC-2 FACTORS RELATED TO THE SPEECH AND HEARING OF CHILDREN OF BELOW NORMAL INTELLIGENCE

Investigator(s): Bruce M. Siegenthaler, Ph.D., Director, Speech and Hearing Clinic, Pennsylvania State University, 110 Psychology Building, University Park, Pennsylvania 16802.
Purpose: To evaluate hearing tests of threshold and discrimination.
Subjects: 122 boys and 87 girls of normal hearing, ages 6 to 15, IQ range: 45-95.
Methods: The subjects are given speech reception threshold and discrimination tests (using Threshold by Identification of Pictures and Discrimination by Identification of Pictures), intelligence tests, and physiological age tests.
Findings: Chronological age, IQ, mental age, and physiological age are not significantly related to hearing test scores. Threshold by Identification of Pictures and Discrimination by Identification of Pictures are as reliable for mentally retarded children as they are for normal children.
Duration: June 1968-January 1974.
Cooperating group(s): Laboratory for Human Performance Research, Pennsylvania State University.
Publications: A limited number of research reports are available from the investigator.

28-HC-3 SOCIAL REINFORCEMENT AND KNOWLEDGE OF RESULTS AS DETERMINANTS OF MOTOR PERFORMANCE AMONG EDUCABLE MENTALLY HANDICAPPED CHILDREN

Investigator(s): Joseph Levy, M.S., Research Associate; and Rainer Martens, Ph.D., Assistant Professor, Motor Performance and Play Research Laboratory, Children's Research Center, University of Illinois, South First Street, Champaign, Illinois 61820.
Purpose: To determine the effects of knowledge of results and of social reinforcement on the motor learning and motor performance of educable mentally handicapped children.
Subjects: 80 children with a mental age range of 5.0 to 10.3 (average mental age: 7.4) and chronological age range of 8.2 to 14.0 (average chronological age: 11.4). Subjects did not exhibit any gross motor or sensory dysfunction or emotional disturbance as determined from school health records.
Methods: A 2 x 4 x 6 factorial design with repeated measures was employed. Factor 1 was knowledge of results. Factor 2 consisted of four social reinforcement treatments: praise, reproof, tangible reward, and control. Factor 3 consisted of six blocks of five trials each. The apparatus used in the motor task was a photoelectric rotary pursuit. The circuit was a circle 12 inches in diameter. The electric light cell moved counterclockwise at a rate of eight circuits per 20-second trial. An analysis of variance was computed for the seconds on target.
Findings: Analysis revealed a significant three-way interaction; i.e., the social reinforcement effects were dependent on the type of knowledge of results provided at different stages of practice. Over all trials those subjects, who received tangible social reinforcement with knowledge of results provided, improved the greatest in performance;

while those subjects in the control social reinforcement situation, who received no knowledge of results, improved the least in performance.
Duration: July 1970-May 1971.
Cooperating group(s): Champaign School District #4.

28-HD-1 SOCIO-BEHAVIORAL STUDY CENTER FOR MENTAL RETARDATION

Investigator(s): Richard K. Eyman, Ph.D., Chief of Research and Director, Socio-Behavioral Laboratory; George Tarjan, M.D., Director, Mental Retardation Unit; and Arthur B. Silverstein, Ph.D., Pacific State Hospital, 3530 Pomona Boulevard, Pomona, California 91166.
Purpose: To study the natural history of retardation for institutionalized and non-institutionalized retardates.
Subjects: Individuals, all ages and sexes, labeled mentally retarded; and normal controls.
Methods: A longitudinal epidemiological methodology is employed, using a variety of methods for specific studies.
Duration: October 1964-September 1971.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: Over 200 articles, monographs, chapters, and books have been published. Most of these publications have dealt with the natural history of mental retardation. A complete bibliography and selected reprints are available from the investigators.

28-HG-1 THE ASSOCIATION OF HYPOTHYROIDISM WITH DOWN'S SYNDROME AND OTHER CHROMOSOMAL ABERRATIONS

Investigator(s): Richard H. Heller, M.D., Director, Genetic Counseling Clinic; Julio Pardo, M.D., Pediatric Endocrinologist; and David Bodenheimer, M.D., Resident in Medicine, Sinai Hospital, 2401 West Belvedere Avenue, Baltimore, Maryland 21215.
Purpose: To study the relationship between hypothyroidism and Down's Syndrome, and the relationship between hypothyroidism and other chromosomal aberrations.
Subjects: Four patients with Down's Syndrome, and one patient with a deletion of an E group chromosome.
Methods: Information that will be collected on the subjects includes clinical cyto-genetic, endocrine, pathologic, family dynamics, epidemiologic, and therapeutic data.
Duration: September 1970-August 1971.

28-HH-1 EFFECTS OF PAIRED REINFORCERS ON LANGUAGE CONDITIONING IN SEVERELY RETARDED CHILDREN

Investigator(s): Richard J. Buckles, B.A., Research Assistant, Pacific State Hospital, 3530 Pomona Boulevard, Pomona, California 91166. (Direct correspondence to Richard J. Buckles, Richard J. Buckles and Associates, P.O. Box 1576, Covina, California 91722.)
Purpose: To test the efficacy of a secondary reinforcer (tone) in the development of language skills in severely retarded children under controlled conditions.

Subjects: 26 severely retarded boys and girls, mean age 5 years 8 months at pretest.
Methods: Subjects were pretested on the Gesell Developmental Test and were randomly assigned to control and experimental groups. Although both groups participated in programs of self-help and social training, only the experimental group received special language training. Special training consisted of half-hour sessions each day in which any verbal behavior was reinforced with food (sugar-coated cereal) and tone (900 cycles per second code oscillator). At the end of a 26-week period all children were posttested on the Gesell, and appropriate statistical tests were conducted.
Findings: Independent t-tests and analysis of variance revealed statistically significant differences at the .01 level for both pre-post experimental differences on the Language Scale and Overall Developmental Age and posttest differences between the experimental and control groups. The experimental group had a mean gain of 3.39 months on the Language Scale, while the control group had a mean gain of 0.70 months.
Duration: August 1968-not reported.
Cooperating group(s): Hospital Improvement Program: An Admission-Release Program for the Severely Retarded, California Department of Mental Hygiene.

Emotionally Disturbed and Mentally Ill

28-JC-1 ADOLESCENT TREATMENT EVALUATION PROJECT

Investigator(s): Alfred H. Stanton, M.D., Project Director and Psychiatrist in Chief; Mollie Grob, M.S., Research Social Worker, Norma Konstadt, B.A., Research Psychologist; Golda Edinburg, M.S., Social Work Consultant; and Richard Longabaugh, Ed.D., Research Social Psychologist, McLean Hospital, Belmont, Massachusetts 02178.
Purpose: To determine the posthospital adjustment of adolescents treated for psychiatric disorders.
Subjects: 67 male and female adolescents, ages 13 to 19, hospitalized between September 1961 and May 1963 with a minimum 3-month inpatient treatment at McLean Hospital.
Methods: A 5-year follow-up investigation has been completed. (See *Research Relating to Children,* Study 24-JI-1.) Extensive interviews were held with former patients and their significant relatives, and preliminary findings were reported. The current stage of the project involves additional data collection, the development of a more comprehensive coding system, and a multivariate analysis. Projected plans include a 10-year follow-up and a new group of patients with controls.
Findings: Final follow-up data were obtained for 96 percent of the sample with improved overall functioning reported for 74 percent. Most improvement was noted in the areas of family relationships and reduced symptomatology; to a lesser degree, progress was made with reference to education and work; and least improvement was shown in social relationships. The remaining 25 percent of the sample was classified as marginally adjusted or worse.
Duration: 1970-1975.
Cooperating group(s): Private grant from an anonymous donor.
Publications: Grob, M. and Edinburg, G. How families view psychiatric hospitalization for their adolescents: A follow-up study. Paper presented at the Second International Congress of Social Psychiatry, 1969. Accepted for publication: *International Journal of Social Psychiatry* (in press).

28-JD-1 PSYCHOPHYSIOLOGICAL FAMILY RESEARCH

Investigator(s): Salvador Minuchin, M.D., Director, Philadelphia Child Guidance Clinic; and Lester Baker, M.D., Director, Clinical Research Center, Children's Hospital of Philadelphia, 1700 Bainbridge Street, Philadelphia, Pennsylvania 19146.

Purpose: To investigate hypotheses that concern transmission of stress in the family; differential emotional arousal of psychosomatic children and their normal siblings and other normal children; the effect of parental conflict on psychosomatic children; and the effect of family change on how the psychosomatic child handles his illness, measured by physiological methods.

Subjects: 10 superlabile diabetic children and their families; 10 diabetic children without psychosomatic symptoms and their families; and 10 families with children who suffer from presumed psychosomatic symptoms such as severe *anorexia nervosa.*

Methods: Each family is interviewed. During the interview blood samples are drawn every 15 minutes to determine the child's free fatty acid level, glucose, glycerol, and lactate changes. The child observes an elicited conflict between his parents through a one-way mirror. Then the psychosomatic or normal diabetic child is either disengaged (told to let the therapist help his parents), or competently engaged (actively assists his parents to resolve their conflict). After a period of spontaneous recovery, acute beta adrenergic blockade is induced in the child. Interviews are videotaped for later blind rating of level of conflict and engagement/disengagement.

Findings: Parental emotional arousal is transmitted to children even through the barrier of a one-way mirror. Even though the child is not involved in the conflict directly, he is aroused by it, as documented by a rise in his free fatty acid level. Some psychosomatic children experience decreased stress when they are competently engaged; others, when they are disengaged. Normal siblings and nonpsychosomatic diabetics turn off emotional arousal spontaneously after the family interview. Psychosomatic children tend to continue at a high level of arousal until the beta blocker is administered. When the family organization of the psychosomatic child is changed, the child's symptomatology changes. Family therapy or family therapy plus drug therapy effect a change; drug therapy alone is significantly less successful.

Duration: 1966-1973.

Cooperating group(s): Philadelphia Child Guidance Clinic; Children's Hospital of Philadelphia.

Publications: Minuchin, S. The use of an ecological framework in child psychiatry. In E. J. Anthony and R. Kubelik (Eds.), *The child in his family.* New York: John Wiley & Sons, 1971; Baker, L. and Barcai, A. Psychosomatic aspects of diabetes mellitus. In O. Hill (Ed.), *Modern trends in psychosomatic medicine,* Vol. II. London: Butterworths, 1970; Minuchin, S. and Barcai, A. Therapeutically induced family crisis. In J. Masserman (Ed.), *Science and psychoanalysis,* Vol. XIV. New York: Grune and Stratton, 1969.

28-JE-1 A REINVOLVEMENT PROJECT FOR PSYCHOTIC CHILDREN

Investigator(s): James Cameron, Ph.D., Program Director, Autistic Children's Program; and Robert Sprett, M.D., Medical Director, Napa State Hospital, Imola, California 94558.

Purpose: To demonstrate and evaluate a program for teaching autistic and psychotic children to tune into their social and material world.

Subjects: 28 to 30 children, ages 4 to 16; male/female ratio, 6:1; selected for their severe tuning out behaviors and negativity, as well as for signs of unused potential.

Methods: The subjects are assigned to one of six groups (families) in the program. Each family has a group of child care workers which provides both consistent support and exposure to new situations and new demands. An assessment team evaluates each family, one family per month. The team uses observational techniques to assess data on staff-child interactions. Variables assessed include staff member's tone of voice, types of staff demands, degree of novelty or difficulty of the staff's demands, the child's willingness to respond, the child's frequency of tuning out, and the child's negativistic behavior. Assessment data are fed back to the families once every 3 or 4 months in order to change the families' operational methods with the children.
Findings: The incidence of tuning out behavior, negativity, and other psychotic symptoms are clearly related to the demand variables. The form of the relationship varies from child to child. Investigators are currently attempting to relate the form of the relationship to certain etiological variables (age of onset of symptoms, soft organic signs, family trauma, and tension levels).
Duration: March 1970-February 1973.

28-JE-2 INDOLEAMINE METABOLISM IN AUTISTIC CHILDREN

Investigator(s): Arthur Yuwiler, Ph.D., Chief, Neurobiochemistry Research, Veterans Administration Center, Wilshire and Sawtelle Boulevards, Los Angeles, California 90073, and Associate Professor, Department of Psychiatry, University of California at Los Angeles; and Edward R. Ritvo, M.D., Associate Professor, Department of Psychiatry, University of California at Los Angeles, Los Angeles, California 90024.
Purpose: To examine the significance of data, collected on a small sample, that indicated that autistic children have higher blood serotonin levels and higher blood platelet levels than age-matched normal children.
Subjects: Approximately 30 autistic children, ages 3 to 11, and a control group of normal children.
Methods: Blood samples were obtained from subjects at a uniform time. Analyses of samples were performed 2 hours after the last sample was collected, and specimens were randomized so that analyses were performed on a blind basis. Platelet assays, hemoglobin and hematocrit value determinations, and serotonin determinations were made. Relationships among clinical status, specific measures of neurophysiological function, and bioamine levels in autistic children under basal conditions and after dietary and pharmacological manipulations of serotonin levels will be examined. Other types of mentally abnormal children with abnormal serotonin levels will be examined to determine if related mechanisms are involved after the serotonin elevations in autistic children are defined.
Findings: Autistic children have abnormally high blood serotonin and platelet levels. There is a normal maturational decline in serotonin and platelet levels from age 1 to age 14. Lowering of blood serotonin levels by treatment with L-DOPA does not appear to ameliorate the symptoms.
Duration: 1970-not reported.
Cooperating group(s): Veterans Administration Center, Los Angeles.
Publications: *Archives of General Psychiatry,* December 1970, 23, 566-572.

28-JE-3 STIMULUS OVERSELECTIVITY IN AUTISTIC CHILDREN: STUDY I

Investigator(s): O. ivar Lovaas, Ph.D.; and Laura Schreibman, M.A., Department of Psychology, University of California at Los Angeles, Los Angeles, California 90024.
Purpose: To study the stimulus selectivity of autistic children in a two-stimuli situation.
Subjects: Nine autistic children; five normal children.
Methods: The subjects were trained to press a bar during the presentation of a complex stimulus that involves the simultaneous presentation of an auditory stimulus (white noise) and a visual stimulus (red floodlight). After the discrimination was established, the separate components of the complex cue were presented singly to assess their control over the subjects' responding.
Findings: The autistic children tended to respond differentially to one of the component cues. However, not all of the autistic subjects showed the effect, and it appears that while autistic children tend to overselect when only two stimuli are present, the effect is intensified with more cues.
Duration: 1968-not reported.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: *Journal of Abnormal Psychology* (in press).

28-JE-4 STIMULUS OVERSELECTIVITY IN AUTISTIC CHILDREN: STUDY II

Investigator(s): Robert Koegel, M.A.; and Hannelore Wilhelm, B.A., Department of Psychology, University of California at Los Angeles, Los Angeles, California 90024.
Purpose: To study the stimulus selectivity of autistic children in a compound stimulus situation with all stimulus components in the same modality.
Subjects: 15 autistic children; 16 normal children.
Methods: Subjects were trained to respond (point) to one of two cards. Each card contained two different forms; e.g., a circle and a square, or a horse and a girl. After the children were trained to consistently point to one of the cards, they were tested to assess the amount of control exerted by each form component.
Findings: Eleven of the 15 autistic children responded selectively to only one of the forms. Only 3 of the 16 normal children responded selectively to one component.
Duration: June 1968-June 1971.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: *Journal of Abnormal Psychology* (in press).

28-JH-1 THE EDISON RESPONSIVE ENVIRONMENT AS A TREATMENT METHOD FOR SEVERELY DISTURBED CHILDREN

Investigator(s): Leonard Cobrinik, Ph.D., Associate Research Scientist in Psychology, Queens Children's Hospital, 74-03 Commonwealth Boulevard, Bellerose, New York 11426.
Purpose: To develop behavioral controls in severely disturbed children through response to a programmed learning environment.

Subjects: Four schizophrenic boys, ages 13 to 15, who demonstrate markedly autistic features.
Methods: The research employs a control design. All subjects participate in the programmed learning program. Two subjects receive, in addition, special equivalent programs that embody forced verbal response. The investigators will evaluate the subjects' ability to (1) complete the regular program with and without keyvoice aids, and (2) read printout and perform workbook exercises associated with the programs.
Duration: 1968-not reported.

28-JI-1 SEPARATE ADOLESCENT UNIT

Investigator(s): C. F. Mynatt, M.D., Superintendent; Terresa Stallworth, M.D., Clinical Director; Don G. Ross, M.A., Director, Adolescent Services; and A. Stanley Webster, Ph.D., Chief Psychologist, Eastern State Psychiatric Hospital, 5908 Lyons View Drive, Knoxville, Tennessee 37919.
Purpose: To provide improved methods of dissemination of information between the Adolescent Unit staff of Eastern State Psychiatric Hospital and other hospital personnel; to provide improved and more direct services to families during and after hospitalization of adolescents; and to provide direct liaison services to public schools and other related facilities.
Subjects: 45 emotionally disturbed adolescents, ages 18 or younger (neither brain damaged nor retarded), who are patients at Eastern State Psychiatric Hospital.
Methods: Adolescent Unit staff members have been trained in group techniques, and data are collected at regular staff meetings. Data are also obtained from families and peers. Through the hospital school and field workers, liaison is maintained with the community, particularly with public schools. Control data consist of data collected from the adolescent program that existed prior to the establishment of a separate unit.
Findings: There has been a 30 percent increase in children's return to the public school system. Liaison and effective working agreements with the public school system have been effected. Effectiveness of a specialized treatment team has been established. There is statistical proof that an effective adolescent program must include family, community, and particularly school systems.
Duration: September 1968-August 1971.
Cooperating group(s): Department of Graduate Psychology, University of Tennessee; Knox County School System; Knoxville School System; National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-JI-2 RESEARCH ON RESIDENTIAL TREATMENT AND RESEARCH ON FOLLOW-UP OF PATIENTS WHO HAVE RECEIVED RESIDENTIAL TREATMENT

Investigator(s): Edwin Z. Levy, M.D., Director of Research, Children's Division, and Lucile M. Ware, M.D., Staff Psychiatrist, Menninger Clinic, Box 829, Topeka, Kansas 66601.
Purpose: To better define the methods, philosophy, and effects of residential treatment.
Subjects: 200 former and 70 current patients, Children's Hospital, Menninger Clinic.
Methods: Clinical psychiatric procedures will be employed. (See *Research Relating to Children*, Study 19-IY-1.)

Findings: Findings to date appear in publications listed below.
Duration: January 1962-continuing.
Cooperating group(s): Staff of the Children's Division, Menninger Clinic.
Publications: *Seminars in Psychiatry*, 1969, 1(1), 3-14; *American Journal of Psychiatry*, 1969, 125(12), 47-53.

Juvenile Delinquency

28-KJ-1 COUNTERCULTURAL DELINQUENCY

Investigator(s): D. F. Duncan, B.A., Graduate Student, Institute of Contemporary Corrections and the Behavioral Sciences, Sam Houston State University, Huntsville, Texas 77340.
Purpose: To study juvenile delinquency among members of what Roszak (1969) termed, "the counter culture"; and to determine the relationship of the countercultural life style to theft-delinquency and to cultural crimes, such as drug abuse and political violence.
Subjects: Delinquents, in institutions and on the streets, who identify themselves with the counterculture; e.g., the Hippie Movement or The Movement.
Methods: Extensive and intensive interviews are conducted with the subjects in natural settings (following the methodology developed by McCord *et al.* in *Life styles in the black ghetto;* and in Duncan, "Stigma and delinquency").
Findings: Preliminary findings indicate that the counterculture is a true cultural phenomenon and is highly relevant to modern criminology.
Duration: September 1969-continuing.
Cooperating group(s): The Institute of Contemporary Corrections and the Behavioral Sciences; Harris County Probation Department, Houston; Alabama Board of Corrections; the Texas Youth International Party.

28-KK-1 DELINQUENCY PREVENTION AMONG MEXICAN-AMERICAN YOUTH (A CULTURAL APPROACH)

Investigator(s): David Lopez Lee, Ph.D., Professor, Chicano Studies, California State College at Los Angeles, 5670 Wilshire Boulevard, Los Angeles, California 90036, and Research Consultant, Arriba Special Service for Groups, Inc., 2325 Seamen Avenue, South El Monte, California 91733.
Purpose: To prevent juvenile delinquency in Mexican-American youth.
Subjects: 20 Mexican-American boys, ages 8 to 13, who were referred by school personnel; and controls.
Methods: A parents' attitude scale will be used. Questions included will measure cohesiveness, supervision, and discipline in the family. A boys' attitude scale and drawings made of a boy, of girls, and of themselves will be used for assessment. Control groups, matched for economic and school background, will be selected from another school district.
Duration: October 1970-July 1973.

Cooperating group(s): El Monte School District, California; Mountain View School District, California; California Youth Authorities; Los Angeles County Probation Department.

28-KK-2 POLICE PROCESSING OF JUVENILES

Investigator(s): Malcolm W. Klein, Ph.D., Senior Research Associate, Public Systems Research Institute, University of Southern California, Los Angeles, California 90007.
Purpose: To develop a comprehensive plan for delinquency prevention.
Subjects: All police departments in Los Angeles County: 77 jurisdictions.
Methods: Interviews will be conducted. Demographic, arrest, and policy data will be collected. All private agencies in Los Angeles County that are potential resources for juvenile delinquents will be investigated by questionnaires and interviews.
Findings: Police arrest definitions and dispositions are highly variable. Variability across communities is not explained by demographic, structural, or offense variables. The use of community resources for juvenile offenders is minimal.
Duration: January 1970-June 1971.
Cooperating group(s): California Council on Criminal Justice; all criminal justice agencies in Los Angeles County.
Publications: Reports are available from Public Systems Research Institute.

THE CHILD IN THE FAMILY

Family Relations

28-LA-1 STUDY OF INFANT ENVIRONMENT OF CHILDREN IN HOMES OF HEAD START FAMILIES

Investigator(s): Lois R. Schulz, Ed.D., Professor of Child Development, California State College at Los Angeles, 5151 State College Drive, Los Angeles, California 90032; and Leila Costa, B.S., R.N., Consultant, Pasadena Community Action Program, Head Start, Pasadena, California.
Purpose: To investigate the backgrounds of children who will enter Head Start programs; to evaluate motivation for learning, emotional security, and pediatric management of infants; and to follow-up the infants until they are old enough to enter Head Start.
Subjects: Infants who will eventually enter Head Start.
Methods: Trained graduate students, supervised by a registered nurse and a college professor, will periodically visit the subjects' families to observe them and to collect questionnaire information.
Duration: Summer 1970-summer 1972.
Cooperating group(s): Pasadena Community Action Program, Head Start.

28-LA-2 EFFECTS OF CHILDREN ON PARENTAL LIFE STYLE

Investigator(s): L. V. Harper, Ph.D., Assistant Professor, Department of Applied Behavioral Sciences, University of California at Davis, Davis, California 95616.
Purpose: To document ways in which a family is affected by the advent of a child.
Subjects: Parents of preschool children: a middle class, white, suburban population.
Methods: Subjects were queried by questionnaire.
Duration: Fall 1970-spring 1971.

28-LA-3 THE DEVELOPMENT OF INFANT-MOTHER ATTACHMENT

Investigator(s): Mary D. Ainsworth, Ph.D., Professor, Department of Psychology, Johns Hopkins University, Baltimore, Maryland 21218.
Purpose: To study the development of an infant's attachment to his mother throughout the first year of life.
Subjects: 16 infant boys and 10 infant girls from white, middle class families. Six of the boys were firstborns.
Methods: The subjects were visited every 3 weeks for approximately 4 hours, when they were from 3 to 54 weeks old. Direct observational methods were employed. Data, in the form of narrative reports dictated from notes after visits, were collected. Supplementary data included periodic intelligence testing and special "strange-situation" procedures at 54 weeks. Data analysis procedures include ratings, coding, and classification.

Duration: October 1962-September 1974.
Cooperating group(s): Foundations' Fund for Research in Psychiatry; National Institute of Child Health and Human Development, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: *Child Development,* 1970, 41, 49-67, and 291-311; Ainsworth, M. D. S.; Bell, S. M.; and Stayton, D. J. Individual differences in strange-situation behavior of one-year-olds. In H. R. Schaffer (Ed.), *The origins of human social relations.* London: Academic Press (in press); Ainsworth, M. D. S.; Bell, S. M.; and Stayton, D. J. Individual differences in the development of some attachment behaviors. *Merrill-Palmer Quarterly* (in press); Stayton, D. J.; Hogan, R.; and Ainsworth, M. D. S. Infant obedience and maternal behavior: The origins of socialization reconsidered. *Child Development* (in press).

28-LA-4 SATIR'S FRAMEWORK OF FAMILY DYSFUNCTIONS

Investigator(s): Luciano L'Abate, Ph.D., Director; and Roberta Golden, M.A., Research Associate, Child Development Laboratory and Family Study Center, Georgia State University, Atlanta, Georgia 30303.
Purpose: To test Virginia Satir's Framework of Family Dysfunctions.
Subjects: Approximately 100 college undergraduate students; and high school students.
Methods: An adjective checklist and tests entitled "What Would You Do?" and "Who Would Say This?" have been created to validate the framework. Data are collected and computer analyzed.
Duration: July 1970-continuing.

28-LF-1 FOLLOW-UP STUDY: CHILD DEVELOPMENT AND FAMILY BACKGROUND

Investigator(s): Mogens Nord-Larsen, Research Associate; and Jacob Vedel-Petersen, Research Director, Danish National Institute of Social Research, Boregergade 28, Copenhagen, Denmark.
Purpose: To study the continued development of groups of children first surveyed in 1964 in order to clarify the dependency between social adjustment and the conditions for growth and development; and to evaluate the prognoses related to the adjustment problems and emotional disorders of children, ages 9 to 12.
Subjects: 1,150 adolescents who were selected in 1964 from 352 classes of grades 3, 4, and 5 in Copenhagen and in a county in Jutland. Half of the children, who had behavior disturbances and adjustment problems, had a sex ratio of two boys to one girl. The other half, the control group of average children, had equal numbers of both sexes. Today 301 of the 1,150 children are still in school.
Methods: The children in school will receive a questionnaire. Those who have left school will be interviewed in person. In both cases their adjustments to school and employment, vocational plans, relations with parents and peers, recreational activities, and attitudes to society will be investigated. Teachers of the children in school will be interviewed. Information from public authorities will be obtained about the youths' possible criminal offenses and contacts with child protection agencies.
Findings: Ninety-five percent of the research population has been located.
Duration: 1961-1972.

28-LH-1 A COMPARATIVE STUDY OF ADOPTED AND NONADOPTED CHILDREN WITH PSYCHIATRIC AND NONPSYCHIATRIC HISTORIES

Investigator(s): Jody W. Vick, M.S., Instructor in Social Work, Pediatrics and Psychiatry, Baylor College of Medicine, and Chief Psychiatric Social Worker, Texas Institute of Child Psychiatry; and Irvin A. Kraft, M.D., Associate Professor, Pediatrics and Psychiatry, Baylor College of Medicine, Houston, Texas 77025, and Medical Director, Texas Institute of Child Psychiatry, Texas Children's Hospital, 6621 Fannin Street, Houston, Texas 77025.
Purpose: To isolate factors that contribute to the successes and failures of child development; and to test the hypothesis that the factor of adoption in itself does not play a totally significant role in the adaptation of a child to his environment.
Subjects: 312 children, over a wide range in four groups: (A) 89 adopted psychiatric patients, (B) 57 nonadopted psychiatric patients, (C) 30 normal adopted children, and (D) 136 normal nonadopted children.
Methods: Data were collected on groups of children of the same age range, sex ratio, geographic area, and socioeconomic status (middle class). Each group was divided by age range: (1) ages under 7, (2) ages 7, 8, and 9, (3) ages 10, 11, and 12, (4) ages 13, 14, and 15, and (5) ages over 15. For groups A and C, statistics were collected from adoptive agencies. For all groups, contacts with families were made, mothers were interviewed, and the data were charted under 26 topics of general information to be compared.
Duration: 1969-1973.
Cooperating group(s): Homes of St. Mark, Houston; DePelchin Faith Home, Houston; Edna Gladney Home, Ft. Worth; Baylor College of Medicine; Texas Children's Hospital.

Childrearing

28-MB-1 DEMONSTRATION OF FUNCTIONAL CONTROL OF OBEDIENCE IN CHILDREN

Investigator(s): Charles D. Maurer, M.A., Doctoral Candidate; and Jeanette Reuter, Ph.D., Associate Professor, Department of Psychology, Kent State University, Kent, Ohio 44240.
Purpose: To train a group of mothers to use verbal praise (VP) and physical proximity (PP) contingent on child obedience (O) to maternal play commands; and to demonstrate that consequent increases in obedience are functionally related to the mother's contingent use of VP and PP.
Subjects: Two 4-year-old and two 6-year-old normal boys and their mothers.
Methods: Five experimental conditions were employed: (1) baseline, (2) cued modification during which the mother was cued to and reinforced for contingent use of VP and PP, (3) probe modification to test for the mother's independent use of contingent VP and PP, (4) contingency reversal, and (5) reinstatement of the modification procedure. O, VP, and PP were scored by two independent observers at 15-second intervals using a time sampling technique. All raw data units were total number of 15-second intervals of a given behavior scored across 21-minute sessions with seven commands given every 3 minutes by the mother.
Findings: All boys increased from a 0 to a 75 percent obedience criterion at least three times during the modification and reinstatement conditions. A significant experimental conditions effect for obedience was found, with 0 highest in probe modification, cued modification, and reinstatement conditions. No age effects were found. The mothers'

contingent use of VP and PP also increased across conditions.
Duration: June 1970-October 1970.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-MB-2 BIRTH OF A NEW SIBLING, MOTHER-CHILD PATTERNS, AND SOCIAL CLASS

Investigator(s): Kate L. Kogan, Ph.D., Associate Professor of Psychiatry; and Muriel King, M.D., Assistant Professor of Psychiatry, School of Medicine, University of Washington, Seattle, Washington 98105.
Purpose: To demonstrate that there are systematic changes in mother-child interactions, which vary according to social class, when a new sibling is born.
Subjects: Five lower class 2- to 4-year-olds and their mothers and five middle class subjects, all firstborn children whose mothers expect to deliver 4 to 6 weeks after the first contact with the investigators.
Methods: Mother-child interaction during laboratory play sessions is recorded and analyzed a month before and a month after the birth of a new baby. Detailed assessments will be made of the changes in inter- and intraindividual behavior contingencies.
Duration: January 1971-December 1971.
Cooperating group(s): Graduate School Research Fund, University of Washington.

28-MC-1 TEACHING MOTHERS TO ALTER THEIR INTERACTIONS WITH THEIR CHILDREN

Investigator(s): Kate L. Kogan, Ph.D., Associate Professor of Psychiatry; and Herbert C. Wimberger, M.D., Clinical Associate Professor of Psychiatry, School of Medicine, University of Washington, Seattle, Washington 98105.
Purpose: To observe and analyze the interaction behavior of a mother and child during laboratory play sessions; and to instruct the mother by immediate feedback to change certain behaviors while the pair is engaged in play.
Subjects: 30 children, ages 3 to 10, and their mothers, who have sought help on how to handle their child's behavior.
Methods: Each participant is rated for relative status, affection, and involvement for each 4-second interval of interaction during weekly instruction sessions. The researcher observes through a one-way mirror and communicates with the mother via an electronic device. Measures of change are taken immediately after the instruction series and again 8 weeks later. Half of the group will have no instruction during the first 8 weeks. Results will be evaluated by analysis of variance, viewing each subject pair's behaviors as the population.
Duration: January 1971-December 1973.
Cooperating group(s): Group Health Cooperative of Puget Sound; National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-MC-2 A HOME LEARNING CENTER APPROACH TO EARLY STIMULATION

Investigator(s): Ira J. Gordon, Professor; B. J. Guinagh; and R. E. Jester, Foundations of Education, School of Education, University of Florida, Gainesville, Florida 32601.
Purpose: To continue an investigation of a home oriented approach to intellectual and personality stimulation of young children.
Subjects: Children, ages 2 to 3.
Methods: Cognitive, language, and personality stimulation of the children will be provided through a program of parent education. The parent education program will consist of nonprofessional visits to the homes and small group learning centers located in the homes of parents involved in the program. The study proposes to increase the feelings of competence and self-worth of the children's mothers and other adults who work with them. The project demonstrates an approach that may become functional as a part of the operation of parent-child centers and neighborhood day care centers in disadvantaged areas.
Duration: September 1970-August 1971.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

SOCIOECONOMIC AND CULTURAL FACTORS

28-NB-1 EDUCATION AND SOCIAL CHANGE IN THE CAMEROUN

Investigator(s): R. Clignet, Ph.D., Associate Professor, Department of Sociology, Northwestern Univeristy, Evanston, Illinois 60201; and P. Foster, Ph.D., Professor, Department of Education, University of Chicago, Chicago, Illinois 60637.
Purpose: To analyze the effect of education on employment in Cameroun; to analyze the characteristics of teachers in Camerounian cities; and to analyze the selectivity of recruitment of students into secondary schools.
Subjects: 230,000 workers in the modern sector of the economy.
Methods: This investigation represents an extension and refinement of previous studies (See *Research Relating to Children,* Study 20-NA-6.) Multiple regression analysis of the skill levels and salaries of the Camerounian workers will be made. Census data from the three major cities of Cameroun: Douala, Yaounde, and Kumba will be analyzed to obtain information about teacher characteristics and recruitment of secondary school students. Census data will be cross-tabulated.
Duration: September 1969-September 1972.
Cooperating group(s): Government of Cameroun.

28-NB-2 A STUDY OF CONSONANCE OR DISSONANCE BETWEEN PARENTAL OBJECTIVES AND SCHOOL OBJECTIVES

Investigator(s): Bettye M. Caldwell, Ph.D., Director; Richard Elardo, Ph.D.; and Evelyn Jackson, M.A., Center for Early Development and Education, University of Arkansas, 814 Sherman, Little Rock, Arkansas 72202.
Purpose: To investigate the hypothesis that enrichment programs impose middle class goals on the children enrolled, and that these middle class goals are not shared by the parents of these children.
Subjects: Parents of the preparatory division children at Kramer, parents of the control school children; 25 preschool teachers in the Little Rock area; 25 child care aides.
Methods: A sample of at least 100 items from the behavioral objectives of the Kramer curriculum will be printed in the form of an attitude inventory. Twenty-five objectives, which neither teachers nor parents are likely to want to foster in the children, will be added to this inventory. Subjects will be asked to indicate their support for each objective on a 4-point scale. A similar study at the elementary level will be conducted during fall 1971.
Duration: May 1971-June 1971.
Cooperating group(s): College of Education, University of Arkansas.

28-NF-1 DEVELOPMENTAL TRENDS IN THE SELECTIVE PERCEPTION OF RACE AND AFFECT BY YOUNG NEGRO AND CAUCASIAN CHILDREN

Investigator(s): R. C. Norris, Professor; and Barbara A. Strain, Research Assistant, Demonstration and Research Center for Early Education, George Peabody College for Teachers, Box 151, Nashville, Tennessee 37203.

Purpose: To determine the differential saliency of race and affect to Negro and Caucasian children.

Subjects: 30 Negro and 30 Caucasian disadvantaged children, ages 5 to 7, from integrated nursery schools, Head Start programs, and first grades in middle Tennessee.

Methods: The subjects performed two consecutively administered tasks (developed by the investigator) in which positively and negatively valenced objects were distributed among two and four photographs of male children. The photographs were varied along racial (Caucasian-Negro) and affect (happy-sad) dimensions.

Findings: Task I: No racial preferences were expressed by 5-year-olds of either race, or older Negro children. Caucasian-biased responses were expressed by 6- and 7-year-old Caucasian children, with preferences increasing with increasing age. Task II: Positive affect was dramatically salient. For all three age groups and for both races of subjects, the happy stimulus photographs of either race received a higher mean placement of positive objects than did any of the sad photographs. Negro subjects showed no significant preferences for either race in the stimulus photograph, while Caucasian children showed greater preferences for Caucasian photographs. Subanalyses also revealed an increasing differentiation between the happy and sad Caucasian stimuli with age of subject; the happy photographs became highly preferred. No such developmental trend was apparent in the reaction to Negro stimulus photographs.

Duration: Spring 1970-August 1970.

Cooperating group(s): Demonstration and Research Center for Early Education, George Peabody College for Teachers.

EDUCATIONAL FACTORS AND SERVICES

General Education

28-OA-1 THE ASSESSMENT, ANALYSIS AND MONITORING OF EDUCATIONAL NEEDS IN A PUBLIC SCHOOL SYSTEM

Investigator(s): Walter S. Lee, Ed.D., Psychologist; and Wilber D. Hawkins, Ed.D., Superintendent, Tamalpais Union High School District, Larkspur, California 94939.
Purpose: To provide data for educational decision making in a public secondary school system.
Subjects: 6,000 students, professional staff, and community of the Tamalpais Union High School District, Larkspur, California.
Methods: The program is composed of three phases: (1) to determine the desired educational goals for the school district, (2) to assess the present level of accomplishment of the desired goals, and (3) to develop and implement problem solving and planning sequences and to determine procedures for recycling. Phase 1 will include the development of district goals, local school subgoals, and performance objectives for courses within instructional departments. Phase 2 will include district-wide assessment in terms of stated performance objectives and analysis of data through electronic data processing. Phase 3 will include problem identification, establishment of priorities, and the application of scientific approaches to problem solving. Following implementation of alternatives, plans for recycling will become operational.
Duration: September 1970-June 1972.

28-OA-2 EARLY GROWTH PLANNING STUDY FOR THE LONGITUDINAL STUDY OF EDUCATIONAL EFFECTS

Investigator(s): Calvin E. Wright, Ph.D., Director, Evaluations and Research Program, American Institutes for Research, P. O. Box 1113, Palo Alto, California 94302.
Purpose: To recommend the age at which it is feasible to start an early cohort pilot study of educational effects on children; to determine when follow-up information should be collected; and to design, develop, and pretest appropriate survey instruments.
Methods: A classification will be devised that encompasses all the types of variables that might be meaningful to relate a pupil's growth and development to the educational process. Relevant information will be collected about selected variables. Questionnaires, scales, and tests will be developed, pretested, and revised.
Duration: July 1970-June 1971.
Cooperating group(s): Office of Education, U. S. Department of Health, Education, and Welfare.

28-OA-3 EVALUATION OF RESIDENTIAL SCHOOLS AND ESSENTIAL FACTORS THAT CONTRIBUTE TO THEIR OPERATION

Investigator(s): George A. Parkinson, Undergraduate School, Milwaukee Technical College, Milwaukee, Wisconsin 53203.
Purpose: To study and evaluate residential technical schools for the disadvantaged to determine the factors that have been essential to their operation.
Methods: The factors that have had either positive or negative effects on the development and operation of residential schools will be elicited through on-site visits and by questionnaires. Data will be evaluated and used to develop a model residential school for the disadvantaged. The model school may be used as a training laboratory for students enrolled in schools of higher education, who are preparing for service in this kind of school.
Duration: July 1970-June 1971.
Cooperating group(s): Office of Education, U. S. Department of Health, Education, and Welfare.

28-OA-4 LEGISLATORS' ATTITUDES TOWARDS EDUCATION

Investigator(s): Karl F. Johnson, Ph.D., Assistant Professor, Department of Political Science, University of Illinois, Urbana, Illinois 61801.
Purpose: To explore the cognitive patterns of legislators as they relate to educational lobbyists, educational issues, and voting on education.
Subjects: Legislators.
Methods: A survey of legislators and a roll-call analysis will be made.
Findings: Variables other than attitudes are more highly correlated to voting patterns on education.
Duration: November 1970-August 1971.

28-OA-5 EDUCATIONAL ARRANGEMENTS FOR SCHOOLS WITH IMMIGRANT CHILDREN

Investigator(s): H. E. R. Townsend, B.Sc., M.Ed., Senior Research Officer, National Foundation for Educational Research, The Mere, Upton Park, Slough, Bucks, England.
Purpose: To provide information about present practices in the administration and organization of the education of immigrant pupils in England.
Subjects: 4,400 English pupils, ages 8, 10, 12, and 14.
Methods: A questionnaire survey of administrative practices will be directed to 146 local education authorities, and a questionnaire survey of organizational practices will be directed to approximately 200 primary and secondary schools that enroll immigrant pupils. Twenty primary and secondary schools will be intensively studied. Attitudes of pupils and teachers will be measured.
Duration: April 1970-September 1972.
Cooperating group(s): Department of Education and Science.

28-OA-6 COMPREHENSIVE EDUCATION PROJECT—STAGE III

Investigator(s): J. M. Ross, Ph.D., Senior Research Officer, National Foundation for Educational Research, The Mere, Upton Park, Slough, Bucks, England.
Purpose: To evaluate the aims of comprehensive education.
Subjects: Fourth year pupils in 12 comprehensive schools; 800 staff members.
Methods: Questionnaires, ability tests, attainment tests, and school records completed by the fourth year are collected for each pupil. Attitude questionnaires are completed by the staff members. Interviews are conducted with heads of schools and other relevant staff members.
Duration: 1966-1971.
Cooperating group(s): Manchester Department of Education; Liverpool School of Education
Publications: *Comprehensive education in England and Wales.* Slough, England: National Foundation for Educational Research, 1968; *Comprehensive education in action.* Slough, England: National Foundation for Educational Research, 1970.

28-OB-1 EDUCATIONAL GUIDANCE PROJECT

Investigator(s): B. R. Barnett, B.A., Senior Research Officer, National Foundation for Educational Research, The Mere, Upton Park, Slough, Bucks, England.
Purpose: To investigate the relationships between curricular guidance, pupil attitudes, and pupil achievement in comprehensive schools.
Subjects: 400 pupils (pilot study) and 2,000 pupils (longitudinal study), ages 14 to 15, who attend selected comprehensive schools.
Methods: During the pilot study two schools will be compared: one with an advanced guidance system (attachment of school counselor), and one school selected at random. A 2-year longitudinal study of a larger group of students will also be conducted. Verbal reasoning tests, attitude scales, and records will be used to collect data on the pupils. Questionnaires and structured interviews will be administered to teachers and parents. Differences and interactions due to schools, social class, verbal reasoning, and pupil satisfaction will be studied. Correlational analysis of variance techniques will be used to analyze the data.
Duration: September 1970-June 1973.

28-OF-1 EFFECT OF ATTENDANCE AT NORTH CAROLINA PUBLIC KINDERGARTENS ON DEVELOPMENT OF 5-YEAR-OLD CHILDREN (1969-1970)

Investigator(s): Hugh I. Peck, Ph.D; Betty H. Landsberger, Ph.D.; and David Kingsley, Ph.D. Candidate, Learning Institute of North Carolina, 1006 Lamond Avenue, Durham, North Carolina 27701.
Purpose: To establish a pre-entrance assessment program, and to evaluate the kindergarten program.
Subjects: 317 kindergartners selected for attendance in eight North Carolina school districts; and 79 children, who were nonselected applicants in five of the eight school districts, as controls.
Methods: The kindergarten children were tested before the program began (December 1969) and after 5 months of attendance (May 1970). The control group was tested in May. Data were collected on cognitive and noncognitive dimensions including (1) knowledge in

ments, between academic achievement and creative ability, and between nonacademic accomplishments and creative ability.
Subjects: All University of Illinois freshmen admitted in 1970 to the Special Educational Opportunities Program, and a control group.
Methods: Data will be collected, compared, and analyzed.
Duration: June 1970-September 1971.
Cooperating group(s): Office of Education, U. S. Department of Health, Education, and Welfare.

28-OF-4 A PREDICTIVE VALIDITY STUDY OF THE VANE KINDERGARTEN TEST

Investigator(s): Glen K. Wallace, Ed.D., Psychologist, Director, Psychological Services, Canadian Valley Regional Laboratory, 502 Admire, El Reno, Oklahoma 73036.
Purpose: To establish a measure of predictive validity for the Vane Kindergarten Test (1968) and its individual subtests.
Subjects: 1,034 children (500 boys and 534 girls); 609 kindergartners; 425 first graders.
Methods: The Vane Kindergarten Test was administered to children in kindergarten. At the end of first grade the Stanford Achievement Test-Primary Battery I was also administered. Correlations were made between the Vane subtest results and the Stanford subtest results.
Findings: The perceptual motor, vocabulary, and man subtests of the Vane Test are significant in predicting school achievement.
Duration: January 1970-June 1971.
Cooperating group(s): Central State College, Edmond, Oklahoma.

28-OG-1 INTEGRATED RESEARCH PROGRAM: FOLLOW-THROUGH CLASSROOM PROCESS MEASUREMENT; TEACHER BEHAVIOR FOR GROWTH OF DISADVANTAGED PUPILS; PUPIL GROWTH IN AND OUT OF SCHOOL

Investigator(s): Robert S. Soar, Ph.D., Professor, Institute for Development of Human Resources, College of Education, University of Florida, Gainesville, Florida 32601.
Purpose: To relate variables in observed classroom behavior to various aspects of pupil growth during the school year and the following summer.
Subjects: Disadvantaged pupils: 70 classrooms, kindergarten and grade 1; advantaged pupils: 24 classrooms, grade 1; and advantaged and disadvantaged pupils: 86 classrooms, grade 5.
Methods: The study represents three projects planned to create an integrated research program. Subjects are pre- and posttested during the academic year and retested the following fall. Systematic observations of classroom behavior are made during the year, using four instruments. Observation data are factor analyzed. Factor scores are related to measures of regressed pupil gain by analysis of variance and/or polynomial regression.
Findings: The preliminary analyses indicate relatively clear relationships between teacher behavior and pupil growth, which differ for concrete versus abstract pupil measures.
Duration: September 1968-September 1972.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare; Office of Education, U. S. Department of Health, Education, and Welfare.

28-OG-2 SOCIAL ADAPTATION AND MENTAL ILLNESS IN FIRST GRADE CLASSROOMS OF AN URBAN NEGRO COMMUNITY: STUDY I

Investigator(s): Sheppard G. Kellam, M.D., Associate Professor, Department of Psychiatry, University of Chicago, Chicago, Illinois 60637, and Director of Assessment and Evaluation and Chief Psychiatric Consultant, Woodlawn Mental Health Center, 841 East 63rd Street, Chicago, Illinois 60637.

Purpose: To determine children's adaptation to the social tasks of the first grade classroom and the relationship of the first grade adaptation to later adaptational status in school, to psychiatric symptom status, and to family characteristics.

Subjects: Six grade 1 populations from 12 public and parochial schools in an urban Negro community; 1,800 children in each population. Families of 2,255 first graders from two populations. Follow-up studies were made on 900 children in each of three populations.

Methods: Periodic measures of classroom adaptation were made in grade 1 and in grade 3, using teachers' ratings on six scales of classroom adaptational behaviors. Mothers rated first graders' classroom adaptational status; self-ratings of adaptational status were made by third graders. Periodic measures of psychiatric symptom status were made in grade 1 and in grade 3; using ratings made on a symptom inventory by teachers and direct observations by clinicians, ratings by mothers of first graders, and self-ratings by third graders. Family life interviews were conducted with 50 percent of the mothers of one population and with all of the mothers of another population. Family functions and characteristics, in terms of the child's relationship to his family and the family's relationship to the community, were investigated. Data were collected from the children's school records on age, sex, promotion, kindergarten experience, school attendance, achievement and IQ test scores, subject grades, and whether or not the child experienced a change of school, classroom, or teacher before or during grade 1.

Findings: Approximately 65 percent of the children studied early in grade 1 are rated maladapting by their teachers; and this prevalence rate persists over the course of grade 1 and in grade 3, and also remains consistent over the 6-year period of the study. Teacher adaptation ratings early in grade 1 are correlated with similar ratings made over the course of grade 1 and again in grade 3, and also with mothers', ratings of first graders, and with self-ratings of third graders. Favorable characteristics of children (being a girl, being older, kindergarten attendance, not repeating grade 1, being in the same school and classroom, and having the same teacher throughout grade 1) are significantly related to being rated as adapting by teachers over the course of grade 1 and again in grade 3. There are significant relationships between family characteristics (parental constellation, mothers' health during pregnancy, leadership role of parents in the community, and length of family residence in the community) and teachers' ratings of adaptation over the course of grade 1 and in grade 3. There are consistent prevalence rates associated with each instrument used to measure symptom status across time, and there are also consistent differences among prevalence rates for various instruments. There are some significant but inconsistent relationships among various measures of symptom status. Longitudinal measures using the same instrument show that children who are rated symptomatic early in grade 1 continue to run a higher risk of being rated symptomatic by the end of grade 1; however, this relationship becomes ambiguous by grade 3. Generally a rating of symptomatic tends to be more transient than a rating of maladaptation. There are significant and consistent relationships between being seen as a symptomatic on various measures and being seen concurrently as maladapting by teachers. Longitudinally there are significant, but somewhat inconsistent, relationships between early classroom maladaptation and the development of symptoms by the end of

grade 1 and in grade 3. Early symptomatic children are more likely to be rated maladapting over the course of grade 1, but this association disappears by grade 3.
Duration: Spring 1964-June 1973.
Cooperating group(s): Department of Psychiatry, University of Chicago; City of Chicago Board of Health; City of Chicago Board of Education; Roman Catholic Archdiocesan School Board, Chicago; Woodlawn Mental Health Center Board; Maurice Ralk Medical Fund; National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: Kellam, S. G.; Branch, J. D.; Agrawal, K. A.; and Grabill, M. D. An evolving strategy for planning in community mental health. In S. G. Golann and C. Eisdorfer (Eds.), *Handbook of community psychology*. New York: Appleton-Century-Crofts, 1971; Kellam, S. G. and Branch, J. D. An analysis of basic problems and an approach to community mental health. *Seminars in Psychiatry*, May 1971.

28-OG-3 SOCIAL ADAPTATION AND MENTAL ILLNESS IN FIRST GRADE CLASSROOMS OF AN URBAN NEGRO COMMUNITY: STUDY II

Investigator(s): Sheppard G. Kellam, M.D., Associate Professor, Department of Psychiatry, University of Chicago, Chicago, Illinois 60637, and Director of Assessment and Evaluation and Chief Psychiatric Consultant, Woodlawn Mental Health Center, 841 East 63rd Street, Chicago, Illinois 60637.
Purpose: To evaluate the short- and long-term impact of a community-wide intervention program conducted in first grade classrooms.
Subjects: Six grade 1 populations from 12 public and parochial schools in an urban Negro community; 1,800 children in each population. Families of 2,255 first graders from two populations. Follow-up studies were made on 900 children in each of three populations.
Methods: The 12 schools in the community were divided into two groups of six; one experimental group and one control group, matched for characteristics. In the experimental schools an intervention program involved participation by the students, their teacher, parents, mental health professionals, and school administrators. The program was evaluated yearly and redesigned to maximize effectiveness. The short- and long-term impacts of the intervention program were measured by comparing changes over time in ratings of adaptation, symptom status, test scores, and subject grades of children in experimental schools to changes made by control children. Chi-square tests, t-tests, analysis of variance, analysis of covariance, correlations, and factor analysis were used.
Findings: The first measured impact of the intervention program was a rise in the baseline ratings of adaptation or the level of teachers' expectations. Assessment of the effect of intervention on adaptation in subsequent years showed a consistent favorable impact on teachers' ratings made at the end of grade 1 and some inconsistent but favorable impacts on teachers' ratings in grade 3. Changes in test scores between grades 1 and 3 were also favorably affected by the intervention program; there was a consistent favorable impact on IQ scores, and an inconsistent finding that language achievement scores were also favorably affected. Preliminary analysis of subject grades indicated that there is a favorable impact on language skills both over the course of grade 1 and in grade 3. There has been no measurable impact on symptom prevalence rates. Generally a measurably favorable impact appears to have been achieved, but it has been modest and is more evident in short-term measures than in long-term measures.
Duration: Spring 1964-June 1973.

Cooperating group(s): Department of Psychiatry, University of Chicago; City of Chicago Board of Health; City of Chicago Board of Education; Roman Catholic Archdiocesan School Board, Chicago; Woodlawn Mental Health Center Board; Maurice Falk Medical Fund; National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

Publications: Kellam, S. G.; Branch, J. D.; Agrawal, K. A.; and Grabill, M. D. An evolving strategy for planning in community mental health. In S. G. Golann and C. Eisdorfer (Eds.), *Handbook of community psychology*. New York: Appleton-Century-Crofts, 1971; Kellam, S. G. and Branch, J. D. An analysis of basic problems and an approach to community mental health. *Seminars in Psychiatry*, May 1971.

28-OJ-1 MODIFYING PARENT-CHILD BEHAVIOR IN A LOW INCOME GROUP

Investigator(s): Milton Theaman, Ph.D., Principal Investigator; and Walter Gadlin, Ph.D., Research Director, Psychological Service Center, New York Society of Clinical Psychologists, 30 West 60th Street, New York, New York 10023.

Purpose: To develop self-help clinics (SHC) in the public schools of low income areas in which parents are trained to help other parents relate to their children, to the schools, and to each other.

Subjects: Parents of children enrolled in eight New York City public schools: 40 parents were trained as leaders; and 400 mothers, ages 25 to 50, primarily Negro and Puerto Rican, attended the clinics.

Methods: Subjects are trained to be (1) leaders for the SHC, (2) leaders for the SHC and T group program (which focuses on parent-child relationships, or (3) leaders for the SHC and interns at a community home for disturbed children. Structured interviews and family and school situation apperception tests are used to measure change in the ways parents relate to their children and to the school before and after clinic attendance. The school performance of children whose parents are involved in the program is compared with the school performance of children whose parents are not involved in the program.

Findings: Many women trained as leaders moved on to full-time jobs, and others went to college. The clinic meetings were attended by more people than regularly attended PTA meetings in the same school.

Duration: September 1968-August 1972.

Cooperating group(s): United Parents Association; Patterson House Division of Wiltwyck School.

28-OK-1 A STUDY OF RACE AND ATTITUDES TOWARDS SCHOOL

Investigator(s): Sandra Koslin, Ph.D., Senior Research Psychologist; and Bertram Koslin, Ph.D., Vice-President for Research, Riverside Research Institute, 80 West End Avenue, New York, New York 10023.

Purpose: To develop noncognitive measures to assess the effects of educational programs and policies on elementary students' attitudes.

Subjects: Approximately 4,000 Negro and Caucasian elementary school students in schools that differ in policies of racial integration and social and racial heterogeneity.

Methods: A test battery of nonverbal measures has been used in field research to study relationships between school integration, classroom racial balance, racial and socio-

economic status heterogeneity, and the noncognitive development of the subjects. Data have been collected in several communities and have been treated with a variety of analytic procedures.

Findings: Racially mixed schools do not necessarily result in favorable interracial attitudes. Classroom racial balance within schools; that is, even distribution of minority students to available classes, appears to be strongly related to favorable attitudes.

Duration: June 1966-continuing.

Cooperating group(s): National Institute of Child Health and Human Development, Public Health Service, U. S. Department of Health, Education, and Welfare; New York State Education Department.

Specific Skills

28-PB-1 CHANGES IN READING ACHIEVEMENT, PERCEPTUAL MOTOR ABILITY, AND BEHAVIOR ADJUSTMENT AS A FUNCTION OF PERCEPTUAL MOTOR TRAINING AND INDIVIDUALIZED REMEDIAL READING INSTRUCTION

Investigator(s): Coralie Dietrich, Ph.D., Assistant Professor, Department of Psychology, Wisconsin State University, Stevens Point, Wisconsin 54481.

Purpose: To determine the differential effectiveness of perceptual motor training and individualized remedial reading instruction on the reading achievement, perceptual motor ability, and behavior adjustment of children with reading problems.

Subjects: 45 children, ages 7 to 12, in an ungraded university laboratory school, who fall in the bottom half of their respective age groups in reading achievement, and who display normal IQs and an absence of organic pathology.

Methods: The subjects, ranked according to age and reading achievement, are randomly assigned to one of three treatment groups: (1) perceptual motor training, (2) reading instruction, and (3) a placebo control group consisting of arts and crafts and social science activities. Each group contains 15 children, and no significant differences exist among the groups in age, IQ, reading achievement, perceptual motor ability, and behavior adjustment. The groups meet for 35-minute sessions, 5 days a week. Each group is divided into two small instructional groups to control for the active agent effect on the treatment methods. Pre- and posttreatment tests will include (1) the Stanford Achievement Test, (2) the Purdue Perceptual Motor Survey, and (3) the School Behavior Profile.

Duration: August 1970-July 1971.

Cooperating group(s): Office of Education, U. S. Department of Health, Education, and Welfare; University Laboratory School, Wisconsin State University; Board of Regents, Wisconsin State University.

28-PB-2 NAVAJO FIRST GRADE BILINGUAL MATERIALS DEVELOPMENT PROJECT

Investigator(s): Muriel R. Saville, Ph.D., Assistant Professor, Department of Curriculum and Instruction, University of Texas, Sutton Hall 411, Austin, Texas 78712.

Purpose: To provide instructional materials for Navajo kindergarten and first grade children, including initial Navajo reading material.

Subjects: Navajo children in six kindergarten classrooms and four first grade classrooms.
Methods: A Navajo-English proficiency test was administered to the first grade subjects and will be repeated in spring 1971 with an informal skills inventory and a test of Navajo reading achievement.
Findings: There are extensive dialect differences in the Navajo language.
Duration: June 1970-June 1971.
Cooperating group(s): Navajo Area Office, Bureau of Indian Affairs.

28-PB-3 ANALYTICAL TESTS FOR READING READINESS

Investigator(s): Marcel Kinsbourne, M.D., Ph.D., Associate Professor of Pediatrics and Neurology, Medical Center, Duke University, Durham, North Carolina 27706.
Purpose: To develop diagnostic instruments to screen preschool children; and to analyze reading disabilities.
Subjects: 250 normal children, ages 5 to 7; 100 children, ages 6 to 10, with learning disabilities.
Methods: A battery of nine tests was designed to indicate separate components of reading readiness and to identify the locus of difficulties in the individual child. Test results will be related to school achievement, psychometric data, and error patterns. Multivariate analysis will be performed.
Findings: Preliminary results indicate that difficulty in visual retention of orientation may be related to retardation in reading skills.
Duration: October 1969-October 1971.

28-PB-4 NATIONAL READING SURVEY OF WALES

Investigator(s): T. James, B.A., Research Officer; and K. Wells, B.A., Research Assistant, National Foundation for Educational Research, The Mere, Upton Park, Slough, Bucks, England.
Purpose: To periodically survey the Welsh and English reading comprehension ability of Welsh children.
Subjects: 3,000 Welsh pupils, ages 11 and 15.
Methods: The National Survey, 6, Test and the Watts-Vernon Test will be administered to the students. Where applicable, a newly devised Welsh language comprehension test will also be administered. Teacher ratings of the "Welshness" of each child and pupil questionnaires on home language background will be collected. The data will be stratified by linguistic region, school type, school size, and sex.
Duration: 1970-1972.
Cooperating group(s): Department of Education and Science.

28-PB-5 THE BIOLOGICAL BASIS FOR DYSLEXIA

Investigator(s): C. Keith Connors, Ph.D., Associate Professor, Department of Psychology, Harvard Medical School, 25 Shattuck Street, Boston, Massachusetts 02115, and Department

of Psychiatry, Massachusetts General Hospital, Fruit Street, Boston, Massachusetts 02114.

Purpose: To identify different types of poor readers, and to ascertain underlying cognitive and neurophysiological deficits in the children and in family members.

Subjects: 100 fourth graders who are poor readers; their siblings and relatives.

Methods: A battery of reading and spelling tests will be administered to 100 fourth grade poor readers. Cluster analysis of reading errors and cognitive tests will be used to identify homogeneous types of poor readers. Extended family members of each poor reader type will then be given the reading battery and cognitive tests, and visual and auditory evoked responses will be recorded. Measures of cerebral laterality and amplitude and latency of evoked responses will be examined for each type. Semantic and nonsemantic stimuli will be employed. Families that appear to show concordance for evoked response characteristics will be examined in later phases of the project for possible biochemical factors that underlie evoked response and reading profiles. Medical histories will be obtained to determine different etiologies of severe reading disorders.

Duration: July 1973-June 1974.

Cooperating group(s): Association for the Aid of Crippled Children.

28-PB-6 NATIONAL READING SURVEY IN ENGLAND

Investigator(s): T. James, B.A., Research Officer; and K. Wells, B.A., Research Assistant, National Foundation for Educational Research, The Mere, Upton Park, Slough, Bucks, England.

Purpose: To periodically assess the reading comprehension ability of English children.

Subjects: 1,250 state school children, ages 11 and 15. Sample is representative of the population in terms of the type of school and sex of pupils.

Methods: Two reading comprehension tests, National Survey, 6, Test and Watts-Vernon Test, will be administered to the subjects. Data on the nationality of each pupil, the expectation of his leaving school, and type of beginning reading instruction (i.t.a. or t.o.) will be obtained from teachers.

Duration: 1969-1971.

Cooperating group(s): Department of Education and Science.

28-PC-1 AUDIO-TUTORIAL ELEMENTARY SCIENCE PROGRAM

Investigator(s): Joseph D. Novak, Ph.D., Professor and Chairman, Division of Science and Environmental Education, Cornell University, 4 Stone Hall, Ithaca, New York 14850.

Purpose: To design a concept-based elementary science program as a vehicle of instruction and as a research tool for studies in cognitive learning.

Subjects: Children, kindergarten through grade 6.

Methods: Audio-tutorial lessons have been designed for children from grades 1 through 6. These lessons present major concepts of science in sequential, individualized study lessons. The program is operational with relatively unprepared teachers and in all varieties of school settings.

Findings: Significant gains have been demonstrated by the students in comprehension of the concepts of molecular kinetics, transformation of energy, and organization of matter.

Duration: September 1965-not reported.
Cooperating group(s): Wabash Valley Education Center; Ithaca Public Schools; Cornell University; Shell Companies Foundation.

28-PC-2 TEACHING SCIENCE TO PRESCHOOL CHILDREN (AGES 3 TO 5)

Investigator(s): Lloyd M. Bennett, Ph.D., Associate Professor; Rose F. Spicula, Ph.D., Associate Professor; and Alice Jackson, Ph.D., Assistant Professor, Texas Woman's University, P. O. Box 22846, Denton, Texas 76204.
Purpose: To determine if young children can learn science facts and concepts; and to determine the science facts and concepts that they can learn.
Subjects: Children, ages 3 to 5, from private schools, from all Negro schools and of various socioeconomic status.
Methods: Children are divided into experimental and control groups. The effects on children's science attainment of various teaching techniques, including team teaching and science games, will be examined. Several statistical techniques will be used in the analysis of the data.
Findings: Preschool children can learn science concepts as they are presented and do not have to be taught weakened versions of science concepts. Several science topics are applicable to these groups. Children's attention span during instruction can be as long as 20 to 30 minutes.
Duration: 1966-continuing.
Publications: Several publications are available from the investigators.

28-PD-1 TEACHING CHILDREN ABOUT HUMAN BEHAVIOR

Investigator(s): Sheldon R. Roen, Ph.D., Associate Professor, Teachers College, Columbia University, 525 West 120th Street, New York, New York 10027.
Purpose: To guide lower primary teachers to introduce behavioral science content into their teaching.
Subjects: 15 teachers and their pupils in grades 1, 2, and 3.
Methods: A structured interview schedule is administered to children in grades 1 to 12 to determine their interests and concerns about behavior and its sociocultural content. Teachers are enrolled in a seminar and create their own lessons and instructional materials to teach their students about behavior. Their classes, and control classes not exposed to the special materials, will be pre- and postmeasured to determine the impact of teaching behavioral science.
Duration: September 1970-August 1971.

28-PD-2 THE INTERGROUP RELATIONS CURRICULUM: A PROGRAM FOR ELEMENTARY SCHOOL EDUCATION

Investigator(s): John S. Gibson, Ph.D., Director, Lincoln Filene Center, Tufts University, Medford, Massachusetts 02155.
Purpose: To develop instructional resources and programs for elementary school students and a programmed seminar for elementary teachers and administrators in intergroup relations.

Subjects: Hundreds of thousands of elementary children and thousands of elementary teachers.

Methods: The research concerns the development of prejudice in children, inputs of instructional resources and teaching, and the learning process with respect to the goals of the intergroup relations curriculum. Control groups, evaluation instruments, and seminars for teachers have been used.

Findings: Results indicate that the enlightened teacher in race relations, the sensitive teacher, and the teacher who engages students in the teaching-learning process can use program activities and units to advance students towards desired goals. These goals include positive self-concept and reduction of prejudgments and misjudgments about people in groups. Teachers' cognitive and affective growth and pedagogy can be advanced positively.

Duration: Spring 1963-continuing.

Cooperation group(s): Office of Education, U. S. Department of Health, Education, and Welfare; National Education Association; State of Rhode Island.

Publications: Gibson, J. S. (Ed.) *The intergroup relations curriculum: A program for elementary school education.* Medford, Massachusetts: Lincoln Filene Center, Tufts University, 1969.

Special Education

28-QC-1 A PROGRAM PROJECT: ARITHMETICAL PROGRAMMING FOR THE MENTALLY HANDICAPPED

Investigator(s): John F. Cawley, Ph.D., Professor; and Henry A. Goodstein, Ph.D., Assistant Professor, Department of Education, University of Connecticut, Storrs, Connecticut 06268.

Purpose: To construct arithmetical instructional programs; and to study teacher practices related to mentally handicapped children.

Subjects: Approximately 3,000 mentally handicapped children, ages 4 to 18, enrolled in public schools and residing in institutions.

Methods: Questionnaires, experimental projects, and continuous assessment procedures will be employed in the research. Verbal problem solving characteristics of the children will be assessed on a daily basis. Developmental studies, curriculum studies, and intervention studies will be undertaken.

Findings: Original learning paradigms hold promise for teaching arithmetic to mentally retarded children. The children do not read the contents of verbal problems, and the operations they use are often irrelevant to the solution. Teachers vary in arithmetic background.

Duration: January 1970-January 1975.

28-QD-1 PROGRAMMING FOR PSYCHOTIC CHILDREN ON WAITING LIST

Investigator(s): Carl Fenichel, Ed.D., Director; and Nanette Doernberg, Ph.D., Director, Research Program, League School, 567 Kingston Avenue, Brooklyn, New York 11203.

Purpose: To evaluate a limited part-time educational program for young mentally ill children and their parents; and to determine its effect on the children's social behavior.
Subjects: All children, ages 3 to 7, who have been diagnosed as psychotic, schizophrenic, autistic, mentally ill, or seriously disturbed, and who are on the League School waiting list.
Methods: Six treatment conditions were studied: (1) parent group, (2) no experimental treatment, (3) instruction and parent group, (4) instruction, (5) instruction with parent observation and parent group, and (6) instruction with parent observation. The instruction condition consists of an hour each week per child of individual instruction for 40 weeks. The parent group condition involves an hour and a half on alternate weeks of parent discussion led by a social worker. The instruction with parent observation condition consists of an hour each week of individual instruction with a parent in the room. Parents are offered an opportunity to speak with the teacher and to meet informally for brief periods with the director of the program. Children and family were randomly assigned to treatment conditions (1), (2), (3), and (4) in the year 1969-70. In the year 1970-71 all children have been assigned to conditions (5) and (6). Subjects will be pre-, mid-, and posttested on a variety of measures. Data will be analyzed by analysis of covariance.
Duration: April 1969-March 1972.
Cooperating group(s): National Institute of Mental Health, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.
Publications: *A home training program for young mentally ill children.* Brooklyn: League School, 1968.

28-QD-2 A PROGRAM CONTENT ANALYSIS OF MASTER'S DEGREE LEVEL TEACHER TRAINING PROGRAMS IN THE SPECIAL EDUCATION AREA OF EMOTIONAL DISTURBANCE

Investigator(s): James R. Tompkins, M.A., Coordinator, Unit on Education of Emotionally Disturbed, Bureau of Education for Handicapped, Office of Education, U. S. Department of Health, Education, and Welfare, Washington, D. C. 20202.
Purpose: To evaluate current master's degree level teacher training programs in the special education area of emotional disturbance.
Subjects: 100 coordinators of teacher training programs for emotionally disturbed children; 100 master teachers who supervise student teachers of emotionally disturbed children; 100 school social workers; 100 school psychologists; and 100 school principals.
Methods: The subjects will evaluate the content of master's degree level preparation programs regarding the applicability of programs to teacher tasks in educating disturbed children. The study includes ratings of importance of teacher needs to successfully teach disturbed children and ratings of confidence of teacher proficiency. Average ratings of confidence in task related items and what appears to be available and current in training programs will be computed; covariance between ratings and statistical significance of differences will also be computed. Chi-square analysis will be used.
Duration: Summer 1970-spring 1971.
Cooperating group(s): Bureau of Education for Handicapped, Office of Education, U. S. Department of Health, Education, and Welfare.

28-QE-1 EVALUATION OF HEAD START PROJECTS AT THE LOCAL LEVEL

Investigator(s): Lois R. Schulz, Ed.D., Professor of Child Development, California State College at Los Angeles, 5151 State College Drive, Los Angeles, California 90032; and Leila Costa, B.S., R.N., Consultant, Pasadena Community Action Program, Head Start, Pasadena, California.
Purpose: To study areas of Head Start programs that may be objectively evaluated by conventional and original tests in relation to specific areas of learning.
Subjects: Local Head Start children's centers in southern California.
Methods: Research findings and summaries of unpublished materials from representative groups will be surveyed.
Findings: Findings to date from specific areas of learning have evidenced gains related to the Head Start program and other gains less well explained.
Duration: Summer 1970-summer 1972.
Cooperating group(s): Pasadena Community Action Program, Head Start.

28-QE-2 EARLY LEARNING PROJECT (FORMERLY PRIMARY EDUCATION PROJECT)

Investigator(s): Lauren B. Resnick, Ed.D., Assistant Professor of Psychology and Co-Director; and Margaret C. Wang, Ph.D., Assistant Professor of Child Development and Research Associate, Learning Research and Development Center, University of Pittsburgh, 160 North Craig Street, Pittsburgh, Pennsylvania 15213.
Purpose: To develop prescriptive curricula, exploratory environments, and learning materials for the education of young children.
Subjects: Approximately 500 socially disadvantaged children who attend preschool, kindergarten, or first or second grade at an urban Pittsburgh school.
Methods: Developmental and basic research will be conducted on all aspects of school functioning—curriculum sequence, classroom organization, teacher training and staff development, and work with parents.
Findings: Curricula have been developed and are being classroom tested or are operational in the following areas: mathematics, classification, perceptual skills, reading, and exploratory activities. The curricula will be extended through grade 3 during the 1971-1972 school year.
Duration: 1967-continuing.
Cooperating group(s): Pittsburgh Public Schools; Ford Foundation.
Publications: Wrobel, Patricia and Resnick, Lauren B. *An investigation of the effects of the application and removal of a token economy on the working behavior of sixteen Headstart children.* Learning Research and Development Center Working Paper 58, 1970; Resnick, Lauren B.; Wang, Margaret C.; and Kaplan, Jerome. *Behavior analysis in curriculum design: A hierarchically structured introductory mathematics curriculum.* Learning Research and Development Center Monograph 2, 1970.

28-QE-3 ALTERATION IN IQ AND ACHIEVEMENT CAUSED BY TRAINING WITH LISTENING SKILLS IN MEXICAN-AMERICAN YOUNGSTERS

Investigator(s): Milton Grossman, M.A., Director, Special Services, and District Psychologist; H. Teller, B.A.; F. Marasco, M.A.; and staff, Administration Center, Sweetwater Union High School District, 1130 Fifth Avenue, Chula Vista, California 92011.

Purpose: To develop listening skills in Mexican-American adolescents in order to ameliorate language handicaps caused by cultural and ethnic differences.
Subjects: 30 educable mentally retarded children (19 boys, 11 girls), ages 13 to 15; 23 educationally handicapped children (20 boys, 3 girls), ages 13 to 15.
Methods: All subjects, both experimental and control, were tested using the Comprehensive Tests of Basic Skills (California Test Bureau). The experimental group will be exposed to listening activities (tapes, records, auditory perception games, and an auditory discrimination approach to prereading) for 8 hours a week. Posttests will be administered at the end of the academic year.
Duration: October 1970-May 1971.

28-QE-4 A STUDY OF THE IMPACT OF DIFFERENT HEAD START PROGRAMS

Investigator(s): John E. Coulson, Ph.D., Assistant Manager, Education and Library Systems Department, System Development Corporation, 2500 Colorado Avenue, Santa Monica, California 90406.
Purpose: To determine the types of Head Start programs that are most effective for various types of children.
Subjects: Approximately 5,500 disadvantaged children, ages 3 to 6.
Methods: Data collected by Head Start Evaluation and Research Centers are being analyzed by System Development Corporation. The primary analytic tool, to determine the relative impact of different programs, is a series of impact analyses based on multiple linear regression methods.
Duration: July 1970-December 1971.
Cooperating group(s): Office of Child Development, U. S. Department of Health, Education, and Welfare.

28-QH-1 MAINTENANCE OF DISCIPLINE THROUGH INCREASING CHILDREN'S ATTENDING SPAN BY TOKEN ECONOMY

Investigator(s): Rudolph F. Wagner, Ph.D., Chief Psychologist, Richmond Public Schools, 809 East Marshall Street, Richmond, Virginia 23219.
Purpose: To motivate children with learning disabilities to learn by using operant conditioning techniques and by controlling disciplinary problems in school.
Subjects: 99 children, ages 8 to 15 (male-female ratio, 4:1; white-black ratio, 2:1), who attended a school for children with learning disabilities.
Methods: A token reinforcement was given to the children if they attended a given task for 15 minutes. The schedule of reinforcement was changed after 8 weeks to two tokens for 30 minutes of attention. A pre- and postreading test was administered to the children to assess achievement. Criterion evaluation was made by the teachers and the principal, who maintained a rating scale on each child.
Findings: Significant differences were found for both Attending Span and Behavior Rating Scale (t significant at the 0.01 level of confidence). The experiment induced student participation, reduced disciplinary problems, and raised teacher morale.
Duration: January 1969-fall 1970.
Cooperating group(s): Altrusa Club of Richmond, Virginia.
Publications: A mimeographed report is available from the investigator.

28-QH-2 CLOSE THE GAP

Investigator(s): Lawrence H. Weiner, Ed.D., Director of Special Education and Pupil Personnel Services, Barrington Public Schools, Barrington, Rhode Island 02806.
Purpose: To detect and remedy developmental delay in kindergarten children.
Subjects: 10 children, ages 4½ to 5½, who are developmentally retarded in maturation and language.
Methods: A diagnostic kindergarten program, with emphasis on special education, was established to detect children's disabilities and marked developmental delays. The children were pre- and posttested using the Meeting Street School Test, the Wide Range Achievement Test, and the Metropolitan Readiness Test.
Duration: September 1970-June 1971.
Cooperating group(s): Bureau of Elementary and Secondary Education, Office of Education, U. S. Department of Health, Education, and Welfare.

28-QH-3 THE NEW MEXICO STATE UNIVERSITY REGIONAL RESOURCE CENTER EXPERIMENTAL SPANISH-ENGLISH BILINGUAL PREKINDERGARTEN-KINDERGARTEN PROGRAM

Investigator(s): Kent W. Kelling, Ph.D., Psycholinguist; and Holly Spoor Huber, Linguist, Regional Resource Center Serving Handicapped Children and Youth, College of Education, New Mexico State University, Box 3AC, University Park, New Mexico 88001.
Purpose: To provide an opportunity for the monolingual Spanish-speaking child to avoid learning problems experienced by an older sibling; and to give the monolingual English-speaking child and the monolingual Spanish-speaking child an opportunity to become bilingual by the time they enter first grade.
Subjects: 20 monolingual Spanish-speaking children and 20 monolingual English-speaking children, born in 1966, who attend prekindergarten and kindergarten between September 1970 and June 1972; a control group of older siblings with learning problems; and a control group of peers.
Methods: Experimental Study: Biographical data, data concerning the children's home linguistic environment, and parental information were collected in parent interviews. No structured language instruction is provided in the classroom. The experimental conditions feature verbal interaction with classmates and a bilingual teacher and a bilingual aide. The older siblings' scores, achieved at a certain grade level on an extensive psychoeducational battery (including language tests, tests measuring learning abilities, and academic achievement tests), will be compared to the scores on these tests achieved by the experimental group when the group reaches a comparable grade level. Language tests and tests that measure learning abilities will be administered to both the experimental group and the control group of peers, using a pre- and posttest design. The mean changes will be compared. Videotape cameras and microphones will record the children's verbalizations which will be analyzed for linguistic competencies. Longitudinal Study: The experimental group's linguistic development in both native and target languages will be studied to show that second language learning occurred, to what degree, and in what relationship to native language development. A study of the verbal interaction process in the classroom, through which the experimental group acquired the target language, will be conducted in order to investigate the environmental factors that may affect language acquisition.
Duration: September 1970-February 1975.

SOCIAL SERVICES

28-RA-1 A STUDY OF THE CHILD CARE SYSTEM IN DENMARK

Investigator(s): Marsden G. Wagner, M.D., Researcher; L. S. Goerke, M.D., Dean; and Mary M. Wagner, Ph.D., Consultant, School of Public Health, University of California at Los Angeles, Los Angeles, California 90024.
Purpose: To document and analyze, in detail and scientifically, the child care system in Denmark.
Subjects: Child care system in Denmark.
Methods: The system to be analyzed includes the child health system, the day care system, the social care system, and the kindergarten and elementary school systems. All written documents will be analyzed, leaders and personnel at the national and local levels will be interviewed, and field visits will be made to all elements of the system.
Duration: February 1971-February 1972.

28-RA-2 SOCIAL POLICY STUDY PROGRAM

Investigator(s): David G. Gil, D.S.W., Professor of Social Policy, Heller School, Brandeis University, Waltham, Massachusetts 02154.
Purpose: To develop a general model of social policy and a systematic approach to the analysis of specific social policies with emphasis on the consequences of alternative policies for child development, family life, and community development.
Methods: A multidisciplinary team of social scientists has pursued the analysis of social policies relevant to its disciplines. The team worked jointly in the development of an analytic method. A general model of social policy and standard analytic framework have been developed. Work is now in progress on specifications of the scope and type in information required for policy analysis in accordance with the standard framework and on testing the framework in the analysis of selected current, past, and newly proposed social policies.
Duration: July 1969-June 1973.
Cooperating group(s): Children's Bureau, Office of Child Development, U. S. Department of Health, Education, and Welfare.
Publications: *Social Service Review*, December 1970.

28-RC-1 UNMARRIED MOTHERHOOD: A COMPARATIVE STUDY OF AGENCY SERVICES AND SOCIAL WORKER ATTITUDES IN CHILD WELFARE AND FAMILY SERVICES AGENCIES

Investigator(s): Lucille J. Grow, MSSS, Research Associate, Child Welfare League of America, 67 Irving Place, New York, New York 10003.
Purpose: To examine characteristics of the services performed by child welfare and family services agencies that relate to unwed mothers; and to determine the relation of setting to worker attitudes towards the unwed mother and her service needs.

Subjects: 82 social workers who serve unwed mothers at member agencies of the Child Welfare League of America and the Family Service Association of America.
Methods: Descriptive information about agency program, clientele, and outreach efforts is gathered through a questionnaire to the executive of the agency. Worker attitudes are elicited through a questionnaire that comprises statements of opinion, in which degree of agreement is to be indicated; and case vignettes, in which choice of alternative courses of action is to be made.
Duration: November 1970-August 1971.
Cooperating group(s): Family Service Association of America.

28-RE-1 THE UTILIZATION OF FOSTER HOMES IN PROTECTION AND WELFARE PROGRAMS FOR CHILDREN IN DENMARK

Investigator(s): Jacob Vedel-Petersen, Research Director; Henrik Tolstrup, Research Associate; Vita Pruzan, Research Associate; and Inger Ørnø, M.S.W., Research Associate, Danish National Institute of Social Research, Boregergade 28, Copenhagen, Denmark.
Purpose: To determine why children, who must be placed away from home, are rarely placed in foster homes but more frequently are sent to institutions (This practice contravenes the recommendations of the law, the methods used in the neighboring Scandinavian countries, and does not agree with the psychological, educational evaluation of the institution's potentiality as a developmental milieu.); and to investigate and analyze the decision-making process of placement procedures.
Subjects: 25 heads of the Child and Youth Authorities; the 11 agencies that arrange placements; the 40 institutions for children; 20 foster homes; 20 families with children in foster homes; and 20 families of children before and after placement.
Methods: Integrated interview schedules were developed and used with all subjects. The respondents were interviewed in person.
Duration: 1969-1972.

28-RE-2 CHILDREN'S RETURN HOME FROM FOSTER CARE: A DEMONSTRATION

Investigator(s): Edmund Sherman, Ph.D., Research Associate, Child Welfare League of America, 67 Irving Place, New York, New York 10003.
Purpose: To test the relative effectiveness of strategies to facilitate children's return home from foster care.
Subjects: Approximately 400 children, under age 13, in foster care, who have been separated from parents for less than 3 years, have at least one natural parent living in the community, and whose parents have not had their parental rights terminated.
Methods: The Child Welfare Service of the Rhode Island Department of Social and Rehabilitative Services is divided for purposes of the demonstration into three segments: (1) a control segment, (2) a segment in which a quarterly monitoring form is completed by caseworkers to insure attention to the status of each child, and (3) a segment that uses the monitoring form and employs two special service workers to work intensively and exclusively with the natural parents. Rates of return home will be compared. Research interviews with the natural parents will be held to assess the effect on the child of his return home.
Duration: March 1971-December 1972.

Cooperating group(s): Rhode Island Department of Social Rehabilitative Services; Community Services Adminstration, Social and Rehabilitation Service, U. S. Department of Health, Education, and Welfare.

28-RF-1 THE DAY CARE NEEDS OF PRESCHOOL CHILDREN

Investigator(s): Dorothy Birchall, Dip. Spec. Ed., Senior Research Officer, National Children's Bureau, Adam House, 1 Fitzroy Square, London W.1, England.
Purpose: To investigate the nature and extent of all types of day care needs, including social, psychological, intellectual, and physical factors.
Subjects: 8,000 children under age 5 who reside in a small English town (population: 110,000)
Methods: The extent of need is separately assessed for each group of children who require some form of day care, including children (1) who require only a few hours a few times a week, (2) for whom substitute day care has to be available for the whole day throughout the week, (3) whose needs are temporary, and (4) whose needs are long-term. Play groups, nursery classes and schools, creches, and day nurseries are examined to determine from their waiting lists the actual number of children in need of day care.
Duration: Summer 1970-not reported.
Cooperating group(s): Department of Health and Social Security; local authority health, education, welfare and children's departments.

28-RF-2 INSERVICE TRAINING PROGRAMS FOR TEACHERS IN DAY CARE

Investigator(s): Nicholas Ciaccio, Ph.D., Psychologist; and Harry Blumenfeld, M.S.S., Jewish Board of Guardians, 66 Court Street, Brooklyn, New York 10019.
Purpose: To evaluate the changes in teacher competence that result from inservice training programs.
Subjects: Teachers in three day care centers.
Methods: Evaluations of teacher competence will be made before and after training.
Duration: January 1971-June 1971.

28-RH-1 PARENTAL CUSTODY AND CHILD WELFARE

Investigator(s): Vita Pruzan, Research Associate; and Jacob Vedel-Petersen, Research Director, Danish National Institute of Social Research, Boregergade 28, Copenhagen, Denmark
Purpose: To analyze legal regulations that concern the relationship between parents and child protection authorities; to assess the assumption that the distribution of legal responsibilities and duties has an influence on the parents' motivation to cooperate with authorities, on the children's attitudes towards caretakers, and on the authorities' influence on the children's development; and to establish a testing ground for a field study of the distribution of responsibility and decision making during placement procedures, whenever the choice consists of a foster home or an institution.
Methods: The historical development of the Danish laws related to parents' custody of their children is described and compared with similar legislation in Norway and Sweden.

The legislation is interpreted in view of its juridical, psychological, and educational aspects. Its advantages and disadvantages in real life situations are delineated.

Findings: The analysis has revealed that, although parents keep custody of their children during placements, their position is weak as compared with the position of protection authorities. The wording of the legislation is unclear and ambiguous. These deficiencies contrast sharply with modern views on family care and treatment and the desire to obtain trustworthy relationships between parents and child authorities.

Duration: Summer 1969-summer 1970.

Publications: Foraeldremyndighed og Borneforsorg (Parental Custody and Child Welfare) *Socialforskningsinstituttets Publikationer,* nr. 41, Teknisk Forlag, Copenhagen, 1970. 64 pp. (In Danish with English summary.)

28-RJ-1 SOCIAL ADJUSTMENT OF ADOLESCENTS DISCHARGED FROM CHILD CARE INSTITUTIONS IN DENMARK

Investigator(s): P. V. Bentsen, Department of Social Affairs Division for Child and Youth Services, Danish National Institute of Social Research, Borgergade 28, Copenhagen, Denmark.

Purpose: To describe the institutional careers and to analyze some aspects of the social development of young men and women who have spent time in different types of child care institutions.

Subjects: 830 individuals selected from 1,300 boys and girls, who were born in 1944 and were discharged from child care institutions after age 14.

Methods: The data collected from official sources included family background, personal characteristics, reasons for admission to and discharge from institutions, school reports, employment histories, income social assistance, and police records.

Duration: October 1968-April 1972.

Cooperating group(s): Danish National Institute of Social Research.

28-RJ-2 A SCHOOL MENTAL HEALTH PROGRAM

Investigator(s): Phyllis Elardo, Ph.D.; Richard Elardo, Ph.D.; Bettye M. Caldwell, Ph.D.; Martha Jane Moose, M.A.; and Claudia Scifres, B.A., Center for Early Development and Education, University of Arkansas, 814 Sherman, Little Rock, Arkansas 72202.

Purpose: To develop a school mental health program that will effectively prevent behavior problems, and to devise a more objective system than is presently available to evaluate changes in pupils' mental health as a function of an intervention program.

Subjects: 50 students, ages 7 to 8; and 25 experimental and 25 control subjects.

Methods: The mental health program will employ techniques such as role playing, modeling, films, classroom discussion, and individual and group therapy to enable students to better understand their behavior. Children, teachers, and staff members will be surveyed to determine their views of good mental health. Data will be categorized into the 10 most frequently cited adaptive and nonadaptive modes of behavior. These categories plus guides from the literature will provide a basis for the assessment of changes in school mental health. Other assessment devices will include a behavior sample measure and teacher rating scales.

Duration: September 1971-August 1972.

Cooperating group(s): College of Education, University of Arkansas.

HEALTH SERVICES

28-SA-1 STREPTOCOCCAL INFECTIONS AND RHEUMATIC FEVER

Investigator(s): Robert W. Quinn, M.D., Professor and Chairman, Department of Preventive Medicine and Public Health, School of Medicine, Vanderbilt University, Nashville, Tennessee 37203.

Purpose: To evaluate the possible roles of streptococcal L forms and phage in streptococcal infections, scarlet fever, rheumatic fever, and in the carrier state.

Subjects: Approximately 200 Negro and Caucasian children, ages 8 to 10, who attend three Nashville schools that serve low and middle socioeconomic Negro and Caucasian populations.

Methods: Weekly throat cultures of the children were taken, and clinical observations were made. Positive cultures were examined for streptococcal L forms and phage. The Dick Test (to determine sensitivity to scarlet fever toxin) was administered at the beginning and at the end of the school year.

Findings: No L forms were isolated; about half of the cultures contained phage. About half of the children reacted negatively to the Dick Test. There were very high carrier rates in 1969-1970 and very low carrier rates in 1970-1971.

Duration: June 1969-May 1972.

28-SA-2 A STUDY OF THE DEMANDS FOR HEALTH SERVICES IN A SUBURBAN COUNTY

Investigator(s): Mildred K. Kaufman, Ph.D., Director of Vital Statistics; and Robert M. Taylor, M.S., Acting Director of Research and Development, St. Louis County Health Department, 801 South Brentwood Boulevard, St. Louis, Missouri 63105.

Purpose: To determine the health needs of different socioeconomic and racial groups in a suburban metropolitan county.

Subjects: Approximately 1,000 white and nonwhite households in three areas of St. Louis County. The households vary widely in socioeconomic status, length of residence, and other social and demographic characteristics. The sample includes all residents of the households.

Methods: A random sample of households was selected within each study area using an area sampling technique. An interview schedule was administered at each household. The wife of the head, or female head of the household, was the preferred respondent. Data were collected that concerned the actual medical care received and the health facilities used by all members of the household. An attempt will be made to relate the demands of people for health care to their actual needs for such care. Actual needs for health care will be determined by a professional clinical advisory group to the project. Project plans include using the data collected to help in the development of recommendations of realistic health programs for these groups. In planning health programs for the various communities in the county, the project staff plans to work with residents of these communities.

Duration: July 1969-June 1971.

Cooperating group(s): St. Louis County Health Department; St. Louis University School of Medicine; National Center for Health Services Research and Development, Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-SA-3 STUDY OF COVERAGE OF ABORTION SERVICES BY TITLE 19

Investigator(s): Helen Wallace, M.D.; Hyman Goldstein, Ph.D.; Edwin Gold, M.D.; and Allan Oglesby, M.D., School of Public Health, University of California at Berkeley, Berkeley, California 94720.
Purpose: To study the extent of the services provided by Title 19 programs for women who seek abortions.
Subjects: Women who seek abortion.
Methods: Questionnaires will be sent to State Departments of Health and Welfare.
Duration: Winter 1970-fall 1971.

28-SA-4 INDICATORS OF CHILD HEALTH AND WELFARE

Investigator(s): Leonard S. Kogan, Ph.D., Professor of Psychology, and Director, Center for Social Research, City University of New York, 33 West 42nd Street, New York, New York 10036.
Purpose: To study patterns of association among selected measures of child health and welfare.
Methods: Multivariate analytic methods will be applied to the correlation matrices of selected measures of child health and welfare to generate a smaller set of indices. The implications of such sets of indicators and indices for social policy and planning will be explored. Results of an ecological approach versus an individual and family approach to sampling units will be compared.
Duration: August 1970-July 1972.
Cooperating group(s): Children's Bureau, Office of Child Development, U. S. Department of Health, Education, and Welfare.

28-SD-1 WELL BABY CARE IN HORNELL, NEW YORK

Investigator(s): Robert A. Hoekelman, M.D., Assistant Professor, Department of Pediatrics, and Director, Well Baby Research Unit, School of Medicine and Dentistry, University of Rochester, 260 Crittenden Boulevard, Rochester, New York 14620.
Purpose: To define the level of well baby care in Hornell, New York before, and 1 year after, the introduction of two nurse practitioners into the area.
Subjects: 95 mothers of children, ages 8 to 9 months, in Hornell, New York; and 21 physicians practicing in the same city.
Methods: Mothers were interviewed to determine what well baby care was received, and to determine their attitudes towards nurse practitioners. Twenty of 30 physicians serving the community were interviewed to learn their feelings about delivery of well baby care in the area and about the use of pediatric nurse practitioners before and after nurse practitioner utilization. A supplemental project determines the attitudes of other

mothers with children of the same age as the subjects' children, and checks records to evaluate the extent of maternal recall for medical care from their children's births until the children are 9 months old.

Findings: Prior to nurse practitioner utilization, 15 percent of the subjects received no well care at all; only 20 percent had received the currently recommended care. Interviews revealed that 11 physicians favored nurse practitioners in Hornell, although 18 physicians felt that nurse practitioners can give adequate well baby care.

Duration: February 1970-December 1971.

Cooperating group(s): Genesee Region Health Planning Council; Townsend Pediatric Research Foundation.

28-SD-2 MATERNAL RECALL

Investigator(s): Robert A. Hoekelman, M.D., Assistant Professor, Department of Pediactrics, and Director, Well Baby Research Unit, School of Medicine and Dentistry, University of Rochester, 260 Crittenden Boulevard, Rochester, New York 14620.

Purpose: To determine the extent to which mothers of infants recall the medical care the child has received.

Subjects: 80 mothers of infants, ages 6 to 12 months, served by private pediatricians, or served by a pediatric clinic.

Methods: Mothers are interviewed to determine the care the child has received since birth. The data are recorded and compared with the actual clinical record. Recall will be analyzed in relation to parity, age, and social class.

Duration: September 1970-June 1971.

Cooperating group(s): Wegman Foundation.

28-SD-3 UTILIZATION OF AVAILABLE WELL BABY CARE BY INDIGENT POPULATION GROUPS

Investigator(s): Robert A. Hoekelman, M.D., Assistant Professor, Department of Pediatrics, and Director, Well Baby Research Unit, School of Medicine and Dentistry, University of Rochester, 260 Crittenden Boulevard, Rochester, New York 14620.

Purpose: To determine the effectiveness of the current methods employed to insure adequate well baby care; and to assess factors that bar the indigent from available well baby care.

Subjects: Mothers, who gave birth to children in Rochester hospitals in September 1968, December 1968, and March 1969; and who indicated that they did not have private physicians to care for their children.

Methods: Records of all the hospital and public health clinics in the community were reviewed to determine the well baby visit and immunization history for each subject's child (N=378) during the first year of life. An index of infant health supervision was calculated for each child. Fifty mothers who extensively used the health services will be compared with 50 mothers who did not use well baby care services often. By a personal interview-questionnaire method, the researcher will attempt to determine the educational, financial, temporal, and distributional barriers to well baby care.

Duration: December 1969-December 1971.

Cooperating group(s): Health Council of Monroe County, Inc.; Wegman Foundation.

28-SD-4 WHAT CONSTITUTES ADEQUATE WELL BABY CARE

Investigator(s): Robert A. Hoekelman, M.D., Assistant Professor, Department of Pediatrics, and Director, Well Baby Research Unit, School of Medicine and Dentistry, University of Rochester, 260 Crittenden Boulevard, Rochester, New York 14620.
Purpose: To test the hypothesis that well baby care rendered by pediatric nurse practitioners during a child's first year of life (on a reduced visit schedule) is as adequate as that rendered by physicians (using standard frequency visit schedules).
Subjects: 120 primiparae mothers over 16 years of age; and their babies who weigh 5 pounds or more, and who upon discharge from the nursery are healthy and should not require extra pediatrician visits. Half of the babies will receive care from specified private practitioners, and half will attend a pediatric clinic.
Methods: The babies will receive care in one of four ways: (1) seven visits from a pediatrician, (2) four visits from a pediatrician, (3) seven visits from a nurse practitioner, or (4) four visits from a nurse practitioner. Mothers will be interviewed when the babies are born and when they are 6 months and 12 months old to obtain information on (1) background, (2) maternal competence, (3) maternal compliance, and (4) maternal satisfaction.
Duration: June 1970-June 1973.
Cooperating group(s): National Center for Health Services Research and Development, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-SD-5 BARRIERS TO THE UTILIZATION OF PREVENTIVE HEALTH SERVICES

Investigator(s): Bonnie Bullough, R.N., Ph.D., Assistant Professor, School of Nursing, University of California at Los Angeles, 405 Hilgard, Los Angeles, California 90024.
Purpose: To determine whether mothers' feelings of alienation (including hopelessness, powerlessness, and social isolation) prevent them from obtaining preventive health care; and to determine if the new comprehensive clinics reach the more alienated mothers.
Subjects: 600 mothers of infants, ages 2 to 4 months, who live in neighborhoods with low median incomes. The mothers represent three ethnic groups: Afro-Americans, Mexican-Americans, and Caucasians.
Methods: Mothers are interviewed in their homes.
Duration: June 1970 - May 1972.
Cooperating group(s): National Center for Health Services Research and Development, Public Health Service, U. S. Department of Health, Education, and Welfare.

28-SD-6 STUDY OF SERVICES FOR TEEN-AGE PREGNANT GIRLS IN LARGE CITIES

Investigator(s): Helen Wallace, M.D.; Hyman Goldstein, Ph.D.; Edwin Gold, M.D.; and Allan Oglesby, M.D., School of Public Health, University of California at Berkeley, Berkeley, California 94720.
Purpose: To study the status and needs of teen-age pregnant girls and the health services available to them.
Subjects: Pregnant teen-agers.
Methods: Questionnaires will be sent to Departments of Health and Education in all cities in the United States with populations over 100,000.
Duration: Fall 1970-fall 1971.

28-SD-7 STUDY OF INFANT MORTALITY — BAY AREA, CALIFORNIA

Investigator(s): Helen Wallace, M.D.; and Ira Gabrielson, M.D., School of Public Health, University of California at Berkeley, Berkeley, California 94720.
Purpose: To investigate the factors that contribute to infant deaths.
Methods: A study will be made of hospital records in the Bay Area to determine the causes of infant deaths. A control group will consist of a sample of living children.
Duration: Summer 1968-June 1972.
Cooperating group(s): Pan American Health Organization.

28-SF-1 EFFECTS OF CLINIC STRUCTURE ON PEDIATRICIAN'S ROLE

Investigator(s): C. A. Nathanson and G. Weiner, Population and Family Health, School of Public Health, Johns Hopkins University, 615 North Wolfe, Baltimore, Maryland 21205.
Purpose: To test hypotheses that concern the relationship between characteristics of clinic organizations and the pediatrician's role.
Subjects: Pediatricians.
Methods: Three aspects of the role of the pediatrician will be examined in five pediatric outpatient clinics in Baltimore. They include (1) the amount of role conflict the pediatrician experiences, (2) his role performance, and (3) his role satisfaction. Organizational variables to be measured are (1) amount and mechanisms of physicians' control over their working conditions in the clinic, (2) level of cohesiveness and professional respect among physicians in the clinic, and (3) the basis of professional status in the clinic and in the hospital. Data will be collected by interviews with clinic physicians and non-physician personnel, systematic and informal observation of clinic operations, and review of clinic documents.
Duration: July 1970-August 1971.
Cooperating group(s): Health Services and Mental Health Administration, Public Health Service, U. S. Department of Health, Education, and Welfare.

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Abstracts of Hospital Management Studies (quarterly), the Cooperative Information Center of Hospital Management Studies, University of Michigan, 220 East Huron Street, 419 City Center Building, Ann Arbor, Michigan 48108.

Abstracts on Criminology and Penology, Criminologica Foundation, Rapenburg 38, Leiden, The Netherlands.

Communication Disorders, Information Center for Hearing, Speech, and Disorders of Human Communication, The Johns Hopkins Medical Institutions, 310 Harriet Lane Home, Baltimore, Maryland 21205.

Current Index to Journals in Education (monthly), CCM Information Corporation, 909 Third Avenue, New York, New York 10020.

Dissertation Abstracts, University Microfilms, Ann Arbor, Michigan 48103. (Gives synopses of U.S. doctoral dissertations with an annual index.)

dsh Abstracts, Deafness, Speech and Hearing Publications, Gallaudet College, Washington, D.C. 20002.

Exceptional Child Education Abstracts (quarterly), The Council for Exceptional Children, Box 6034, Mid City Station, Washington, D.C. 20005.

Health Economic Studies Information Exchange, Division of Medical Care Administration, Public Health Service, Washington, D.C. 20402.

Index Medicus, National Institutes of Health. Order from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Language and Language Behavior Abstracts (quarterly), Center for Research on Language and Language Behavior, University of Michigan, Ann Arbor, Michigan 48104. Order from Subscription Manager, LLBA, Meredith Publishing Co., 440 Park Avenue South, New York, New York 10016.

Mental Retardation Abstracts, Division of Mental Retardation, Social and Rehabilitation Service, 330 Independence Avenue, S.W., Washington, D.C. 20201. Concerning abstracts write to Lemar J. Clevenger, Project Administrator, MRA, American Association of Mental Deficiency, 1601 West Broad Street, Columbus, Ohio 43223 or Miss Patricia Thuben, Project Officer, Division of Mental Retardation, Rehabilitation Services Administration, Social and Rehabilitation Service, Washington, D.C. 20201.

Nutrition Abstracts and Reviews, Commonwealth Bureau of Animal Nutrition, Bucksburn, Aberdeen AB2 9SB, Scotland.

Poverty and Human Resources Abstracts (bimonthly), Institute of Labor and Industrial Relations, University of Michigan-Wayne State University, P.O. Box 1567, Ann Arbor, Michigan 48106.

Psychological Abstracts, American Psychological Association, 1333 - 16th Street, N.W., Washington, D.C. 20036.

Rehabilitation Literature, National Easter Seal Society for Crippled Children and Adults, 2023 West Ogden Avenue, Chicago, Illinois 60612.

Research in Education (monthly), Leasco Systems and Research Corporation, 4833 Rugby Avenue, Bethesda, Maryland 20014.

Sociological Abstracts, 15 East 31st Street, New York, New York 10016.

The Educational Resources Information Center (formerly the Educational Research Information Center), better known as ERIC, supplies current research and research-related information to teachers, administrators, researchers, commercial organizations, and others. ERIC includes 20 clearinghouses, or documentation centers, located at universities and other institutions throughout the country. Each clearinghouse concentrates on a different subject matter area in the field of education. For complete information, write: Director of ERIC, Office of Education, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20202.

The Excerpta Medica Foundation, New York Academy of Medicine Building, 2 East 103rd Street, New York, New York 10029, and 119-123 Herengracht, Amsterdam C, The Netherlands has established an abstracting service on pediatrics, available on a yearly subscription basis. In addition to abstracts, the Foundation provides to subscribers, at cost, photocopies and translations of complete articles.

The Minnesota Family Study Center supplies to interested scholars bibliographic information from the Inventory of Published Research in Marriage and Family Behavior. Address requests to: Director, Inventory of Published Research in Marriage and Family Behavior, Social Science Tower 1026, University of Minnesota, Minneapolis, Minnesota 55455.

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The Library of the National Bureau for Child Welfare (Voor Kinderbescherming), Stadhouderslaan 150, The Hague, The Netherlands publishes abstracts of articles in the field of child welfare each month. These are in Dutch, but those familiar with the Universal Decimal System would be able to understand something about the articles. The subscription rate for documentation on cards is 30 guilders (approximately $8.40).

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PURPOSE:

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METHODS: (Please discuss research design: control groups, methods of data collection, research instruments, unique features of research, statistical treatment.)

FINDINGS TO DATE:

DATE PROJECT INITIATED:		ESTIMATED TERMINAL DATE:
PRINCIPAL INVESTIGATOR(S):	DEGREE:	POSITION AND ORGANIZATION:

COOPERATING GROUPS: (In the research itself or in the research finding.)

PUBLICATION REFERENCES: (If no publication is planned, please indicate under what conditions data and results will be available.)

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center on children or their families in such areas as child growth and development, intelligence, personality, education, social adjustment, family life, physical and emotional disorders

concern service programs in the fields of child health, child welfare, or special education

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animal studies

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PUBLICATIONS

Bibliography on the Battered Child, revised July 1969. Copies free from the Children's Bureau, Office of Child Development, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20201.

Research Relating to Emotionally Disturbed Children, 1968. A listing of studies reported to the Clearinghouse between 1956 and 1967, including publication references. Single copies free from the Children's Bureau; also available *directly* from the Government Printing Office, Washington, D.C. 20402, for $1.00. Do *not* send money to the Children's Bureau.

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